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Food Systems under Stress in Africa

African–Canadian Research Cooperation

Proceedings of a Workshop held in Ottawa, Ontario, Canada 7–8 November 1993

Edited by
Ronnie Vernooy and
Katherine M. Kealey

The International Development Research Centre
Le Centre de recherches pour le développement international
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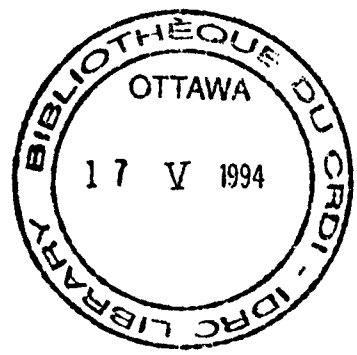

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Contents

Foreword

Human populations in most countries in the South are currently doubling their populations every 20 to 30 years. At the same time, the most productive land is largely occupied and, in some cases, has been overexploited to such an extent that yields are starting to decline. This, for example, is the case with the green revolution technologies that initially led to large yield increases in the Punjab. Increasingly, food production gains in Africa have been achieved by intensifying production on ever more marginal land. Adding to these stress factors, is the likelihood of less predictable rainfall as a result of global climate change. These considerations are particularly serious in Africa where most agriculture is rain fed and where some of the largest population growth rates are found.

Stress needs to be looked at from the unified perspective of people in their environment. In the most dramatically negative cases, poverty, social breakdown, and degradation of the resource base interact in a mutually reinforcing downward spiral of increasing poverty and resource depletion.

Two caveats need to be made about this often cited scenario. The first is the tendency to blame the victims for the "crime" of environmental degradation. Ultimately, underlying socioeconomic structures of exploitation, social inequity, violence, and fragmentation must be addressed to correct or improve this situation.

The second is that stress needs to be considered in a historical perspective that also gives credit to human ingenuity, inventiveness, and the desire to improve one's lot and that of one's children. References to resource depletion as a result of peasants' ignorance are not uncommon in the colonial literature of Africa. Yet several recent restudies of areas where colonial administrators were predicting ecological doom have shown quite the opposite. The Overseas Development Institute's (ODI) Machakos study in Kenya is one example where farmer adaptation and investment in terracing have dramatically improved land productivity under difficult semi-arid conditions. Similarly, recent anthropological and historical research by James Fairhead of the School of Oriental and African Studies and Melissa Leach at the Institute of Development Studies (IDS) of the University of Sussex has shown that in Guinea's forest-Savanna transition zone, the impact of human intervention has been to create forest islands. Conventional wisdom considered that these were remnants of a forest landscape that had undergone massive deforestation.

In considering the research agenda for Food Systems Under Stress in Africa, it is important to consider both the conditions that make this kind of inventive local action possible, and preferably reinforce it, as well as forces that undermine such creativity and ways of counteracting or eliminating these.

This publication brings together the papers presented and discussions held during a seminar entitled "Food Systems Under Stress: African–Canadian Cooperation," organized by Canada's

International Development Research Centre (IDRC) on 7–8 November 1993, at the Citadel Inn in Ottawa, Ontario, Canada. The 2-day seminar brought together African and Canadian researchers and program staff from IDRC's head and regional offices to work on the questions of food security and natural resource management, especially in the fragile ecoregions of Africa.

By way of acknowledgments, on behalf of all the participants, appreciation is gratefully extended to the following persons for their excellent organization and thorough preparation and follow through. Among those who worked so hard to ensure the success of the seminar were Louise Perry, Huguette Poirier, and Judith Poirier who worked two long days as interpreters switching rapidly and eloquently from English to French and vice versa. Rob Zorn silently and efficiently took care of the sound and microphone system. IDRC's Lyse Lavictoire made the necessary arrangements with the Citadel Inn, which provided excellent services and lunches, and Margaret Langill, also of IDRC, coordinated the travel schedules.

The members of the Program Support Unit of the Environment and Natural Resources Division helped with financial and administrative tasks. Sue Davies transcribed two seminar presentations and several pages of notes.

Katherine Kealey brought together the seminar presentations and professionally guided us through the editing process and produced the completed manuscript of this publication within 2 months of the seminar. IDRC's Robert Charbonneau and Bill Carman supported our initial idea to publish the seminar proceedings and took care of its rapid printing and distribution.

Other IDRC staff included Saïdou Koala, Yianna Lambrou, Ola Smith, Luis Navarro, Hartmut Krugmann, and Pat Thompson who all made valuable contributions to both the development and the realization of the seminar. A special word of gratitude goes to Sheryl Davidson who helped us from start to finish with the numerous organizational tasks, all of which contributed to making the seminar an especially successful event.

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Food Systems Under Stress

Recently, as part of its new Corporate Program Framework for 1993–1996, IDRC has integrated "Food Systems Under Stress" as one of the six Centre-wide response themes to the Agenda 21.[1] The Food Systems Under Stress theme proposes, as one of its major objectives, to target the links between food production, poverty, and environmental degradation in Africa, Asia, and Latin America. In the case of Africa, special attention is paid to the arid and semi-arid areas where food insecurity and resource depletion are very serious problems. In terms of the people affected by these problems, the Centre's focus is on the rural poor, marginalized in both the economic and the political sense, including small-scale farmers (women and men), the landless, pastoralists, and groups displaced by conflicts or droughts or both.

We consider that research should examine the interrelated factors that put food systems under stress; affect food security at different levels, especially at the local level; and contribute to the degradation of natural resources. At the same time, research should look for solutions to overcome the negative impact on food production, distribution and consumption, and on the environment. As population numbers are increasing almost everywhere, the creation of employment (especially labour intensive) is of crucial importance to improve livelihood in the rural areas and diminish the exodus to cities, most of which are already facing high rates of unemployment and underemployment.

To find viable solutions for existing problems, an important research *and* policy question to ask is how the people affected by food insecurity, poverty, and resource degradation experience and perceive their situation. Also, how do they envisage possible alternatives for the difficulties they encounter day after day (see, for example, Chambers 1987; Huss-Ashmore and Katz 1989; Davies and Leach 1991; Maxwell 1992).

These questions force us, at the same time, to keep an open eye on the different and often opposing/conflicting perceptions, experiences, and interests of women, men, and children as individuals. They must also be considered in their roles as members of larger social units, such as households, associations, interest groups, and communities. Social differentiation and differential responses to change are main characteristics of many of today's (rural) societies in transition (Long 1989; Long and Long 1992). Too often, research tends to overlook these characteristics.

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[1]For a description of IDRC's new corporate framework and research agenda see "IDRC Corporate program framework 1993–1996" (IDRC, March 1993), "Empowerment through knowledge: The strategy of the International Development Centre" (IDRC, April 1993), and "Meeting the global challenge: Themes and programs of the International Development Research Centre" (IDRC, May 1993).

As several of the seminar participants emphatically pointed out, this requires the need to (a) build upon research that has been carried out in the past in the area of food security (Phillips and Taylor 1991; Shenton 1993) and (b) assess and, where necessary, improve our analytical and methodological research tools (see for a similar argument regarding ethnographic techniques, Hammersley 1992).

To carry out research on these problems and questions implies that we must deal with the dynamic interplay of ecological, economic, technological, and political factors. It also means, however, that we must look at the social construction of knowledge, that is, the ways in which people's relationships with others influence their ideas, roles, and decisions. Here, of course, we must study relationships based on gender, age, class, and ethnicity.

Objectives of the Seminar

To realize this goal is a major capacity-building challenge that requires interdisciplinary and interinstitutional cooperation, both at the country, the regional, and the international level. This is why at the seminar, which, given the great needs, focuses on the African context, we have researchers with various disciplinary backgrounds (agricultural economics, political economy, nutritional sciences, sociology, anthropology, history, agronomy, ethnobotany) who are working at African and Canadian universities. One participant works at a European university and another at an American.[2]

As the regional directors and staff of IDRC's African offices repeatedly have underlined, we consider that existing Canadian expertise could be helpful in building or strengthening the research and training capacity on food security problems issues and enhance forms of cooperation with African colleagues. The seminar, therefore, should be instrumental to:

- Obtain an overview of the major problems and research questions in the different African regions.[3]
- Obtain an overview of existing Canadian research expertise on major issues related to food systems under stress.
- Contribute to the development of an interdisciplinary approach for food systems under stress research, which we hope will be an important input for future IDRC-project development.
- In the long term, we will look for ways to help African researchers gain and maintain the skills to carry out such research. Also, ways

[2]See the list of participants for details of their institutional affiliation, address, and telephone/fax numbers.

[3]The seminar dealt with East, West, and Southern Africa. Unfortunately, we were not able to include North Africa as the invited speaker and the IDRC program staff based in Cairo were unable to attend.

will be sought to build cooperation and solidarity among African and Canadian researchers involved in food security issues through formal and informal collaboration (projects, networks).

Seminar Program

To set the stage, the seminar started with an overview of research/action issues and needs from the African regions, presented by selected African researchers from each region. In the chapter on "African Perspectives," we present the papers by E.B. Sonaiya and Suzanne Coulibaly on West Africa; Ruth Oniang'o, Nyangabyaki Bazaara, and Augustin Nkundabashaka on East Africa; and Mandi Rukuni on Southern Africa. These regional overviews were followed by Johan Pottier's (School of Oriental and African Studies, University of London, England) presentation of the first results of a concrete research project on food systems under stress in Africa, cofunded by IDRC and the Ford Foundation. His paper concludes the "African Perspectives" chapter.

As a first input for the discussion, these presentations were briefly commented upon by IDRC program officers from the Dakar office (Ola Smith), the Nairobi office (Luis Navarro and Hartmut Krugmann), and the Ottawa office (Saïdou Koala). Their observations are included in this executive summary.

From the African contributions, we moved then to the Canadian presentations. The Canadian researchers were asked to address two broad areas of research that were suggested by IDRC regional program officers in Cairo, Dakar, and Nairobi. These areas are the following:

- Analysis of existing and development of alternative production and management systems (encompassing drylands, rangelands, and pastoral systems) at the household and community level that avoid further environmental degradation. This includes traditional and newly designed techniques that prevent the degradation or stimulate the regeneration of land, forest, and water; diversification of economic activities; and value-added activities.

- Analysis of existing and development of new policy tools that contribute to solving problems related to (a) land and tree tenure (conflicts) and the negative impact on food production and the environment, and (b) the lack of or inadequate forms of local participation and organization for decision making, and (c) gender roles and inequalities.

In the chapter on "Canadian Perspectives" we present the papers by Suzanne Gervais and Micheline Beaudry, Gérard Ghersi and Frédéric Martin, John Galaty, Timothy Johns, Derrick Nault, Gustaaf Sevenhuysen, Jonathan Barker, and Fiona Mackenzie. The seminar ended with discussions in three smaller groups dealing with research priorities, research partners and methodology, and a plenary presentation. A synthesis of these discussions in the form of a conclusion will be presented in the following.

Summary/Conclusions

In this summary we present the major outcomes of the discussions. First, we give some general points made concerning the role of research and researchers. This is followed by a synthesis of key research topics that emerged from the papers and debate. Finally, a report is given on the discussions held in three small working groups that came together on the afternoon of the second day (each focusing on one region: East, West, and Southern Africa). These groups were asked to look at regional research priorities, research partners and research methodology.[4]

Role of Research

The seminar confirmed that research can play an important role in development. It can provide useful and (more) adequate information to decision-makers, be they farmers, extensionists, or policymakers and contribute to defining sets of development alternatives, both short and long term (e.g., technologies, institutional innovations, policy measures, and incentives). It was agreed that participatory research approaches should be used where possible in an effective and efficient way, involving all relevant stakeholders who have an interest in the specific research and development question(s).

This does not mean that we must reinvent the participatory wheel again, but lessons should be learned from past experiences, successes, and failures. It does mean, however, that researchers should be prepared to perform the role of "convenor," that is, to create the fora where stakeholders can come together to discuss the generation and use of scientific and traditional knowledge, and the relationships between that knowledge and economic and political interests at local and supralocal levels.[5]

Empowerment through research means not only finding solutions for problems, but also supporting the less privileged in their efforts to organize themselves, build their own management, coordination, evaluation, and research strengths and create room for manoeuvring. In the different regions of Africa there is a need for researchers to support farmer groups and associations and women and youth groups in their struggles to improve their livelihoods. They should be assisted in their efforts to participate effectively in the development process by getting control of their resource basis and by making decisions concerning the allocation\distribution of resources.[6]

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[4]We would like to thank Augustin Nkundabashaka, Fiona Mackenzie, Jonathan Barker, and Yianna Lambrou for taking notes of the discussions in the three small groups.

[5]There is a growing awareness among researchers that this is an important new role to play if we wish to make research more useful in solving the problems experienced by marginalized and poor people. This implies, of course, a critical rethinking of the role science and scientists have played in the past (see, for example, Van Dusseldorp and Box (1993)).

[6]This argument was made in the paper "Mutations et stratégies d'adaptation des agriculteurs de Basse Casamance," by Mamadou Lamine Sonko from the Senegalese Institute of Agricultural Research (ISRA). Unfortunately, because of travel problems, Mamadou Lamine Sonko was unable to attend the seminar.

The role of IDRC is to encourage researchers, both African and Canadian, to follow the foregoing approach and to convince other donors to adopt a similar policy allowing for enough flexibility to adjust to new circumstances. IDRC should continue to bring together African and Canadian expertise; facilitate training for African researchers, locally, in Canada, or where the required expertise is available; and support local institutions in their capacity-building efforts.

Major Research Topics

- A better understanding of *different* livelihood, survival, and accumulation strategies (class, gender, age, ethnicity differences) including the definition of stress indicators.

- The improvement of the validation, diffusion, adoption, use of existing and new technologies (e.g., intercropping systems, anti-erosion techniques, food-processing techniques, improved crops, but also organizational arrangements and policies).

- The improvement of support services for the rural sectors, such as extension, credit, marketing, and training.

- The documentation, validation, and use of traditional knowledge and practices and the relationship with intellectual property rights (e.g., indigenous foods and medicinal plants, food storage and conservation techniques, resource management techniques).

- The improvement of the access to and ownership and use of land, trees, and livestock, especially in the light of increasing population pressure.

- The impact of structural adjustment policies, especially on the poor, and the development of policy alternatives, including policy incentives to stimulate sustainable resource use and management.

- The impact of international food aid and the need to develop alternative food security programs and projects.

- To support emerging grass-roots organizations (e.g., farmers' and women's groups) in their research, management and organizational efforts and to mobilize political support for these groups and for rural development in general.

West Africa

- The necessary parameters that should be part of the research process are the historical context of the area and the people and the attention that should be given to the dynamics of the process of change that people experience.

- The focus should be on household food security problems to avoid the disastrous impact of food policies such as those implemented by the Sub-Committee on Nutrition of the United Nations Administration Committee on Coordination (ACC/SCN). Key stress factors, as perceived and experienced by the food insecure should be identified.

- Research should build upon existing knowledge and past research results.

- Research should support and reinforce local-level organizations in their development efforts.

- Given the dynamic nature and the complexity of the process of change and the problems people face, an interdisciplinary approach is a prerequisite.

- Participatory methods should be used where possible during all phases of research from problem identification to the definition of solutions. These methods give the "voiceless" a voice and are conducive to a democratic development process.

East Africa[7]

- The research should be long term and interdisciplinary, including specialists in agriculture, ethnobotany, rural economics, administrative and political organization, health, gender, culture, and political economy. The socioeconomic, political, and ecological history of each district will be analyzed, with a focus on important changes and the links between local and wider historical currents.

- The research project should last at least 10 years to do justice to the slower and deeper processes of change that may not be visible in a shorter research period.

- Research should focus on the relationships among gender and class, land tenure, and ecological change. Behind this focus lies the hypothesis that the social disadvantages for women and poor households (limited access to land and other resources) pushes them

[7]To address priorities, partners, and methods, the group decided to design a concrete research project in three districts in three Eastern African countries that could serve as a model. The nine districts would be selected to represent different ecological zones, production systems, and degrees of food stress (for example, agricultural, agropastoral, and pastoral districts, and areas experiencing severe ecological damage as well as areas not under immediate environmental risk).

to resort to practices that may undermine agriculture and damage the environment in the longer run.

- A priority will be to study the strategies that people, individually and collectively, with different status in terms of wealth and gender employ in situations of stress.

- Special study will be made of the ways in which different categories of people understand and use wild and domestic plants and animals and how their uses and understandings are changing. This will be related to health, environmental stress, and ways of coping with economic difficulties.

- The linkages each district has to the wider society will be analyzed in terms of the sale/purchase of goods, the employment and supply of labour, the movements of technologies and knowledge, and the workings of government and policies.

- Participation in research design and implementation will be encouraged to ensure locally accountable and effective results and to facilitate the creation of a regional network of researchers.

- Complementary research techniques will be used: archival research, in-depth collection of oral agricultural histories to establish the historical context, and participatory rural appraisal to document change and quantitative techniques in the collection of data on health, economy, and agriculture.

- Research assistants will be recruited among graduate students in national universities and among local people. Students should focus on issues that are relevant to their studies/disciplines and for which they will earn academic credit. The long-term commitment of the project will make it easier to recruit skilled and dedicated people without paying them salaries that favour them over local government employees.

- Although the research commitment is long term, a central goal will be to achieve useful results in the first year or two. This requires the need to look for low-cost changes and innovations at the farm level.

- The project should devise ways of recording and expressing results in accessible ways to the local people. Drama, stories, and visual representations could be useful tools to achieve this goal as part of a participatory research agenda.

Southern Africa

- Research should focus on the improvement of local-level food securities strategies. A key objective is to link food insecurity stress factors to poverty indicators by starting research on the ways in which people perceive and experience poverty and stress factors. Hence, the cultural dimension should receive emphasis, a dimension that is too often is overlooked.

- An important action point is to remove barriers to small-scale enterprise development as an alternative economic development strategy for people in rural and urban areas when they can no longer rely on traditional coping strategies. This would, at the same time, address one of the most pressing problems in the region: the lack of viable employment.

- Rural–urban relationships should be taken into account as many of the people's activities and social networks cut across this divide.

- The validation of traditional practices of resource use involving the local people should be a cornerstone and innovations should build upon this expertise/knowledge.

- Research should offer "a menu" of secure alternatives that clearly indicate the policy implications both at the short and the long term. Already existing alternatives (for example, technologies) should be disseminated, tested, and, if necessary, adapted by potential users.

- A multistakeholder approach should be encouraged including researchers, farmers, policymakers, extensionists, agribusiness, and nongovernmental organizations, but it is critical to define the political context in which they and the research project operate. This means, among others, to look at the ways in which the stakeholders link to each other, or fail to do so, and what their perceptions and interests are concerning major research issues.

- A cross-country or cross-regional, comparative study design should be used selecting zones with similar problems but different socioeconomic or cultural characteristics.

- Research teams should be interdisciplinary with a strong social science component and be action-oriented, and objectives should be defined in measurable terms to evaluate the effectiveness of the research.

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African Perspectives

Food Systems Under Stress: Research/Action Issues and Needs in West Africa

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Abstract *West Africa's food production systems are unable to feed the people adequately because of the many physical, biological, technological and legal constraints. The most important issues affecting food security and sufficiency are population pressure, land availability, rainfall pattern, soil fertility and management, as well as land degradation aggravated by technological forces. All these factors combine to result in very low crop yields. What is needed is a greatly expanded program of agricultural research focused on the small-scale farmer and that builds upon traditional systems that have proved sustainable in West Africa's environment. In the humid and subhumid zones, a versatile cropping system must be developed that can compensate for the low natural supply of nutrients by adding a permanent supply of organic matter. In the savanna and sahel zones, plants that are drought tolerant and can grow and produce under moderately saline conditions must be identified and thoroughly investigated. Research toward a close integration of crops and livestock is urgently needed in all zones. Multidisciplinary studies are needed to understand and resolve the problems arising from cultural and legislative constraints. Long-term and interdisciplinary research is also needed to meet the challenges of genetic resources conservation, pest and disease control, feed and forage development, environmental management and accountability, and sustainable food production.*

It has been pointed out by Igbozurike (1977) that "The ultimate measure of agricultural success is the degree to which agricultural operations are in harmony with their environmental base and consistently meet the food, fibre and physiological needs..." of the people.

Accurate statistics of food production and supply in West Africa are hard to come by because small-scale farmers who consume most of the food they produce make up a large proportion of the population. Also, data collection tends to focus on export and industrial crops and large ruminants rather than on food crops and small stock.

The data in Table 1 reflect the relationship between food production, food imports, and individual food security in West African countries between 1989 and 1992. Most of these countries had a negative change in per capita food production. More important, all the countries, apart from Cote d'Ivoire, had about 20% or more of their populace food insecure; all, except Senegal and Togo, had an infant mortality rate of about 100/1000 live births; while about 20% of the children were suffering from moderate to severe malnutrition. These figures should be taken with caution, but we who live in the region suspect that they are underestimates.

It must be realized that West Africa's food production systems are constrained by many physical, biological, technological, and legal factors within the environment in which they are operating. The success with which the physical and biological factors are utilized is greatly dependent on the available technology and legal codes governing their utilization by the different food systems.

Table 1. Food security and sufficiency in West Africa.

	Per capita food prod. (1979-80 = 100)		Import dependency ratio (%)	Total fertility rate	Avg % of popn. food insecure	Infant mortality rate/1,000
	1989–90	90–91	1986–88	1992	1989–90	1992
Benin	-2.8	+0.9	9.3	6.2	18	111
Burkina Faso	-11.2	+15.0	9.6	6.5	32	132
Cape Verde	+5.0	-3.0	66.2	—	19	—
Côte d'Ivoire	-4.4	-3.0	20.5	6.6	8	94
Gambia	-16.6	+7.9	55.4	6.5	19	132
Ghana	-13.6	+22.2	9.9	6.1	36	81
Guinea	+3.5	+1.6	15.2	7.1	—	132
Guinea-Biss.	+39.0	—	18.2	6.0	23	147
Liberia	-18.8	-3.5	24.0	6.2	30	132
Mali	-4.3	+3.3	9.3	7.1	35	164
Mauritania	-7.1	-3.8	57.2	6.8	25	117
Niger	+0.7	+18.7	7.4	7.2	28	123
Nigeria	-1.7	+3.1	6.7	5.9	17	94
Senegal	-8.3	-3.2	30.2	6.5	21	76
Sierra Leone	-0.2	-12.7	20.1	6.5	23	142
Togo	-3.6	-3.6	17.8	6.5	29	84

Source: FAO (Food and Agriculture Organization of the United Nations). The State of Food and Agriculture, 1991, 1992. FAO Agriculture Series Nos 24 & 25, FAO, Rome, Italy. ADB (African Development Bank). 1993. Report. ADB, Abijan, Nigeria.

Issues

Social

The most important issue affecting food security is population pressure. In all countries, total food production has been increasing. The population, however, is increasing at more than twice the rate of food production. Since 1965, the infant mortality rate has been brought down 30%, whereas life expectancy was increased by about 7 years. The total fertility rate, however, remains quite high. Closely tied to this is the increase in urbanization and migration into the cities and changes in dietary patterns. The net effect of these factors was to turn West African countries into net importers of food by the 1970s.

Technical

The physical and climatic constraints are many. Many countries have large land areas but little arable land to bring into cultivation. No country except Liberia has less than 40% of its land

area already in use. Many of the countries with nearly all their cultivable land in use have installed major improvements, particularly irrigation, but some are also using marginal land on an unsustainable basis with the result that it may become so degraded (e.g., through erosion, depletion of the thin layer of top soil, salination) that it can no longer produce.

Apart from land availability, the most important characteristics to consider are rainfall pattern and soil fertility and management. The length of the rainy season as well as total precipitation are major constraints to food production. The rainy season varies between 3 and 4 months in the driest savannas to 6–9 months in the tropical rain forests. Absolute yearly rainfall varies between 300 and 3000 mm.

The fertility of most soils is low and variable, and is another constraint to food production. This limited fertility means that it is relatively easy to push the ecosystem beyond its capacity to sustain use. In the savanna areas, soil organic matter is low and is easily depleted; the soil surface layer is prone to sealing, less water enters the soil and hence less forage is produced. These forms of land degradation can be aggravated by technological forces. For example, the use of mineral and protein supplements enables the maintenance of livestock productivity during the dry season but the constant high stocking rates gradually deplete soil organic matter.

The use of fire for land management is also of note. Frequency and timing of burning are the most important. Early-season burning, for example, can interact with lack of rainfall to change species composition and increase the likelihood of erosion and hence reduce grazing potential. Using fire to clear land releases carbon dioxide and methane, the greenhouse gases, which change the climate toward warmer temperatures (UNCED 1992). One of the most significant climatic changes seen most clearly is the shorter rainy season. Although the amount of rainfall remains the same, the shorter season of heavier rainfall adversely affects crops, such as yam, that require rainfall to be evenly spread out over a longer period.

This shortening of the growing period is important because about half of the area (i.e., the Sahel and Savannas) has less than 180 days growing period. The higher temperatures encourage more crop diseases and pests. Indeed, about a quarter of the crops produced are consumed by pests, destroyed by disease, or overgrown by weeds. All these factors combine to result in very low crop yields obtained in the region (Table 2).

Legal

Political conflicts — civil wars, military activity, and land right conflicts — have been a great impediment to food production particularly in the 1960s–1980s. Perhaps more important, if less visible, are effects of many inappropriate policies, regulations, and laws inflicted on the agricultural systems. Nationalization or privatization of land and resources and the total control of all factors of production by the central government featured prominently.

Generally, access to land was inequitable particularly for women. The recurring series of government projects requiring ever more land exacerbated the problem. Many parastatals were set up for all aspects of agricultural operation and subsidies were applied to these inefficient monopolies.

Table 2. Highest and lowest yields of food crops in selected countries of almost similar climatic conditions.

Highest yields Crop	Country	kg/ha -1 yield	Lowest yields per country	kg/ha -1 yield
Wheat	Netherlands	7598	Nigeria	1400
	Egypt	4997	Niger	2000
Rice	Egypt	6490	Burkina Faso	2054
	Puerto Rico	6000	Sierra Leone	1303
Maize	Puerto Rico	5000	Senegal	1097
	USA	7023	Togo	950
Millet	Saudi Arabia	2083	Gambia	949
	China	2151	Côte d'Ivore	569
Sorghum	Peru	3528	Guinea	1417
	Mexico	2923	Guinea Bissau	633
Cassava	Barbados	24000	Sierra Leone	3314
	Mauritius	14545	Gambia	3000
Sweet Potato	Egypt	27778	Mauritania	1000
	Israel	39158	Mali	1900
Soybean	USA	2182	Nigeria	349
	Zimbabwe	3453	Côte d'Ivoire	600

Source: FAO, 1989, Yearbook Vol. 43, Rome.

More recently, intensification and monocultures are favoured for crop and livestock. On the Mambilla plateau in the northeastern state of Taraba, Nigeria, free grazing cows of the pastoralists eat up the green manure plant (*Tephrosia vogelii*) on which the fertility of the land depends and so reduce crop yields. This degrades the soil and causes conflicts between graziers and crop farmers.

The establishment of grazing reserves was designed to prevent these conflicts. But natural grazing reserves themselves are subject to overstocking and overgrazing. In Nigeria, there are 323 grazing reserves identified in 11 states with a total land area of 2.8 million hectares. Out of these, only 48 are gazetted and many are undeveloped and overgrazed (Sonaiya 1993).

Needs

Relief is the usual first level response to the recurrent food crisis. Distribution systems are established for food and other basic materials. Relief is, however, short term and seldom addresses any of the issues raised in the foregoing or those of participation, sustainability, or mobilization of the peoples. Rehabilitation is the second-level response. It seeks to redress the loss or disability suffered, restoring the situation to a precrisis mode. Apart from being an impossible task, it seldom extends beyond a couple of years, is capital intensive, and is merely an extension of relief.

Development is the proper response. It attempts to address the underlying causes of the food crisis. It includes, among other things, mobilizing community resources and adopting a learning process. A sustainable development process requires a long-term approach involving years, perhaps decades. It is obviously unfair and unrealistic to demand this kind of support from an external body no matter how beneficent. The role of support/donor agencies in the development of adequate food systems in West Africa should, therefore, be that of catalyst.

It is clear that the farming systems of Africa's dryland regions depend on effective recycling of nutrients among crops, animals, and soils (Scoones 1992). Traditionally, this is achieved through a variety of farming practices, such as kraaling of animals on fields for their dung, fallowing of land, and intercropping with legumes. In many drylands, crop farmers dig wells and provide water to herders who visit in the dry season in exchange for the animals being kraaled on the farmer's field overnight. Over a period of several months, farmers can get their soils well fertilized and if, the rains are good, reap excellent harvests. With increasing population pressure, this nutrient transfer between animals and crops may need to be modified into a semi-intensive system.

Prevention of water and wind erosion is of great importance. In Burkina Faso, villages in the northwest province of Yatenga had lost a third or more of their lands to sheet erosion before farmer's groups started building low stone barriers across their fields to hold back rain water. The technique has restored life to areas that had turned into barren desert. In Niger, wind breaks of neem trees are planted to slow down wind erosion. They also improve the crops, increasing the yield of sorghum and millet by 20%. In addition, the trees provide desperately needed fire wood.

Intercropping is being modified into agroforestry where trees and shrubs are planted alongside crop plants, and alley cropping where rows of shrubs and crop plants are sowed alternately. Other efforts concentrate on improved strains of native crops (especially drought-resistant species), small-scale, no-cost irrigation schemes, no-tillage planting systems, village fuelwood lots, and other types of reforestation and natural pest control.

What is required is to build on these initiatives with a greatly expanded program of agricultural research focused on the small-scale farmer and dryland farming, closely linked to forestry, and traditional systems that have proved sustainable in West Africa's environment. For example, massive amounts of money have been invested in pastoral and agricultural development. Despite the technical capability provided, most agricultural development programs have been abject failures.

Considerable land degradation has occurred because government and individuals have sought to extend land use beyond its potential. This is especially true of the Savanna areas.

Traditional pastoralism, however, fully exploits the episodic nature of the Savanna, for example, by moving from one area to another in sympathy with seasonal conditions. Sometimes, cropping is done on an opportunistic basis. There is mounting evidence that these forms of use are more economically efficient and less ecologically damaging than the sedentary systems (Young and Solbrig 1992).

Research Directions

Humid and Subhumid Zones

In these zones, shifting cultivation still persists. Because of growing populations, the fallow period has become shorter, which in the absence of increasing input, results in decreasing yields. A system has to be developed that can compensate for the low natural supply of nutrients in morphologically old soils by developing a versatile cropping pattern and adding a permanent supply of organic matter.

Although these zones have a high number of growing days, the necessity to increase crop yields and to maintain soil productivity requires more versatile cropping systems (i.e., greater intercropping) than those in the Savanna and Sahel zones. The purchase of fertilizers and herbicides/pesticides is often difficult and prohibitively expensive and the permanent application techniques for plant canopies require further development. Experimentation using various multi-cropping systems is required, as well as studies that take into consideration the problems of mechanization and improvement of cropping systems. The improvement of soil management can also help to improve yields. Techniques such as minimum tillage combined with mixed cropping are important for the control of soil erosion.

In areas where climatic temperatures do not force a break in the vegetation cycle and where the growing season is more closely related to availability of water or rainfall, crops cultivated during different times of the year react differently. Different cultivars, therefore, must be used for different growing periods. This is the case with maize in Nigeria where three cultivars UI1, TZPB, and TZB reacted similarly in the first growing season but differently in the second.

Savanna and Sahel Zones

In the dryer Sahel and Savanna zones, people already live under marginal conditions. Marginal growing conditions are denoted by drought, salinity concentrations in soil and irrigation water, and high or low temperature extremes. In drought conditions, new crops should receive greater attention. Soil salinity has grown worse in recent years as the amount of land under irrigation increased. In irrigated areas of northern Nigeria, for example, salt accumulation has caused average wheat yields to drop by half in the past 5 years.

In coastal areas, such as the Casamance region of southern Senegal, inlets and tidal rivers flood the land with sea water and deposit salts. Sea water also infiltrates ground water in these areas and introduce salt into the soil from below. But faulty irrigation is the worst culprit in salinization. Salinity can seldom be totally remedied by leaching. In most cases, plants must be

developed that can still grow and produce under moderately saline conditions. Salt-tolerant crops include sorghum, rice, cotton, and date palms. In addition, plants that will improve saline soils must be thoroughly investigated.

The highly acidic soils of the Savannas make other crops difficult to grow, and crop yields are correlated with availability of fertilizers or manure. This requires a close integration of crops and livestock. During the dry season, animals graze harvested fields of sorghum and millet dropping manure while grazing. It has been estimated that cattle void about 0.6 kg and sheep 0.2 kg of manure while grazing and double these amounts overnight during kraaling. Kraaling animals on the fields allows the crops the full benefits of both manure and urine. In dry areas, where crop residues decompose very slowly, the ruminant converts fodder into manure and thereby enhances the productivity of the farming system.

Special Topics

Genetic Resources

Genetic diversity is part of the natural environmental resource that should be conserved and utilized. It is recommended that:

- Breeding and genetic research be directed at formulating realistic breeding strategies to avoid inappropriate breed replacement or dilution and to promote improvement of selected indigenous genetic resources in normal environments.

- Research support be provided for programs of in-situ preservation for some animal species or breeds in danger of replacement or dilution (e.g., Hartlaub's duck, indigenous pigs, local chicken, and Muturu cattle).

Pests and Disease Management

The control of parasitic and vector-borne diseases has depended on the use of pesticides that, if improperly used, have adverse effects on the environment. It is recommended that:

- Chemical control methods be replaced as far as possible with biological control (e.g., trypano-tolerant breeds and vaccines against microbial diseases).

Feed and Forage Resources

The focus should be on improved use of feed resources, particularly at the smallholder level and with special emphasis on feeds produced on-farm. In the semi-arid and arid zones, emphasis should be on improving fodder conservation, fodder trees, and grazing systems. In the humid and

subhumid areas, the requirement is for high-quality feed obtainable from local production systems often in the form of nitrogen-fixing legumes to complement forage. It is recommended that:

- The use of nodulated legumes as cheap and safe sources of nitrogen for both pasture and ruminant livestock be demonstrated.

- Low or nongrain diets incorporating unconventional feedstuffs be developed for nonruminant livestock (Sonaiya 1992).

Environmental Accounting

Current indicators of economic performance usually fail to account for the consumption or the degradation of nonrenewable natural resources. The cost of their conservation and maintenance is not adequately assessed. If the cost of production does not include the cost of conserving the land on which it is produced, or the replacement of the nutrients it withdraws from the soil, it then means that food production depletes the natural resource capital (FAO 1992). It is recommended that:

- The land suitability maps that have been developed, for example, by the Technical Centre for Agricultural and Rural Cooperation (CTA) and FAO be used to establish the limits beyond which "mining" or capital consumption sets in.

- A method of quantifying the use of natural resources by extensive and semi-intensive systems of animal production be developed (Sonaiya 1992).

Sustainability

A range of methods be used to test theories of sustainability and environmental degradation. The Bayero/Maiduguri/Cambridge Agropastoral Research Project in Nigeria is doing this by examining the behaviour and objectives of farmers and herders in four villages that differ in rainfall, ecology, ethnicity, and economic specialization (Haramata 1992). It is recommended that:

- Such synthesizing, collaborative, and interdisciplinary research projects be developed in each of the four ecological zones of West Africa as models of sustainable food-production systems that conserve biological resources, respect traditional forms of land use, monitor natural and social changes, and use all such information in a dynamic way to improve overall management of natural resources.

Environmental Management

Development projects must incorporate environmental impact assessment. This is particularly relevant to large-scale projects financed by external agencies and covering many

political boundaries. In northern Nigeria, for example, inadequate assessment of irrigation development projects in Kano, Yobe, Katsina, Sokoto, and Kebbi States has resulted in altered tenure rights to *fadama* land (i.e., wetlands), increased land-use conflicts, and undermined the sustainability of wetland production systems.

The Hadeija valley *fadamas* have been affected both by river impounding by the Tiga dam, designed for large-scale irrigation projects, and by the promotion of small-scale irrigation pumps on a massive scale. These have resulted in a number of conflicts between pastoralists, who are increasingly excluded from their dry season grazing lands, and crop farmers (Kolawole 1991). It is recommended that:

- Multidisciplinary analyses that involve animal scientists, agronomists, and socioeconomists be conducted to understand the interaction between animal agriculture (especially pastoralism) and crop agriculture and between ecological and environmental processes.

- Environmental education and training programs be developed for farmers' organizations, students, researchers, and policymakers. Such a program should be incorporated into all agriculture training curricula.

Legal Framework

The attainment of food security and self-sufficiency needs to be supported by appropriate legislation. Laws, regulations, agreements, and standard licencing conditions are required for use of and title to land and for common property systems that will promote land conservation, management of natural resources, and the protection and development of the rural areas.

For example, Nigeria is a signatory to all major international conventions concerning conservation except the Convention on Wetlands as Waterfowl Habitat (i.e., Wetlands or Ramsar Convention Treaty of 1971). Yet the role of wetland patches in livestock management is vital as these areas produce high grass biomass available at strategic times (FDLPCS 1992). The *fadama* of northern Nigeria are important grazing resources for Fulani pastoralists. Access to *fadama* grazing land, however, is being increasingly restricted as agriculture expands in the *fadama* provoking conflicts over wetland resources and occasional bloodshed (Kolawole 1991).

The wetlands of southern Nigeria provide habitat and sojourn for native and migrating waterfowls. Urbanization and other development requirements are endangering both habitat and inhabitants (Sonaiya et al. 1991). It is recommended that:

- A thorough documentation of all legal instruments, customary laws, and cultural arrangements should be made and an assessment done to review their effect on food production.

- Information should be made available to legislators to enable them to repeal, amend, or reenact all instruments to make them favourable to food-production systems.

Conclusion

The attainment of food security and self-sufficiency calls for a change in food consumption patterns. Given West Africa's ecological zones, there are certain food types, such as wheat, barley, and oats, that cannot be produced widely and efficiently. But the region can produce many tropical staple foods efficiently and extensively. First, it is important to design policies to ensure a realignment of the consumptive patterns with production capabilities. As Adedeji (1991) put it "[West] Africa must stop the habit of producing what it does not consume and consuming what it does not produce and cannot afford." Second, the pressures upon the food production systems will persist and heighten unless population growth is maintained at sustainable levels. Third, development of the food-production systems require appropriate choice of technologies and human resource development. Fourth, the support and full participation of the ordinary people, the majority of whom are in the rural areas, must be sought and obtained.

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Women, Migration, and Forest Resources: The Case of Burkina Faso

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Abstract *For centuries, women have had vast knowledge of forestry resources that has enabled them to manage trees and tree products in an efficient manner. This knowledge has been transmitted informally between members of the same family; from the older ones to the younger ones. Because of the increasing pressure on the natural resource base, which forces many rural women in Burkina Faso to migrate to towns and cities, this knowledge is used less and less. This, in turn leads to the further deterioration of the natural resources (e.g., desertification).*

Burkina Faso is a landlocked country at the edge of the southern Sahelian zone (some 274,000 km^2 and a population of about 8 million). Rains decrease in intensity and frequency from the south to the north. This, to a great extent, demarcates the climatic and vegetation zones. The Sudano–Guinean zone is situated in the southwestern part of the country. It has higher rainfall (100 mm) and scattered forests and wooded grasslands. Ligneous species in this zone are found in higher densities and are taller and more stratified than in other areas.

The Sudan climatic zone is the most extensive. It is poorer in forestry products than the Sudano–Guinean zone. In fact, because of lower rainfall and an extended dry season, the scattered forests have many short or only average-height trees. The foliage is less than abundant and trees are gradually replaced by thorny species. These unfavourable climatic conditions are an enormous handicap for agricultural production always so dependent on rainfall. Since the beginning of the 1970s, the country has suffered from insufficient rainfall resulting in continuing low levels of agricultural production. Other factors that are contributing to this low productivity are the monotony of cultivated varieties and plagues.

In spite of these conditions, agriculture is the cornerstone of Burkina Faso's economy. In fact, it occupies more than 90% of the work force (census of 1985), produces 50% of the gross national product (GNP) and generates more than 65% of exports. Forestry resources, which offer an inestimable number of products used not only for food but also for medicinal purposes, compensate to some extent for agricultural deficiencies. Thus the natural habitat in Burkina Faso is in very high demand. This demand increases as the population increases. As a result, there is extreme degradation of the environment and reduced agricultural production. Agriculture in Burkina-Faso is mainly done on small, family farms with women playing a leading role. Not only do they participate, as do all the other members of the nuclear family, in cultivating the fields, but they take all the responsibility of domestic work fetching water and firewood, cooking food, etc.). The exploitation of forestry resources is, in fact, the exclusive domain of women.

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[1]This paper is based on notes prepared for the seminar and on a paper entitled "Women, migration and natural resource management." (*In* Women, environment and development network. Wednet Review and Assessment Meeting, 28 April to 1 May 1993, Environment Liaison Centre International, Nairobi, KE.)

This major responsibility in the economic life of the family, however, does not mean that women have a privileged position. Resources and production are controlled exclusively by men. The plots given to women for their own cultivation tend to be situated on less fertile ground; and women have difficulties getting inputs such as fertilizers to improve the soils.

The effects of the two serious droughts (1972–1973 and 1984–1985) and irregular rainfall have made the conditions more difficult for women, especially those who live in the Sahel and the Central Plateau. In fact, the great famine, which was a result of decreased agricultural production, and the drought have increased women's workload. The women of the Sahel and the Central Plateau have to devote more time searching for firewood because they have to travel long distances, sometimes tens of kilometres. The chore of fetching water begins early in the morning and finishes late at night.[2] To complete this dismal picture, the products that used to be gathered and used to compensate for agricultural deficiencies, have become more and more scarce.

When families are faced with harsh conditions like these, and given the almost nonexistent financial resources they have, they migrate. The regions of the west and south–west, which have a relatively better climate, and large towns have become the major areas that receive these migrants. In the cities, they try to make a living in the informal sector, which, however, rarely provides enough income to live a decent life. It is important to note that families only decide to migrate when all other alternatives have been exhausted. When they move, therefore, they have very little to sustain them. To survive, they turn to forestry resources. Women play a significant role in the exploitation of these resources because they have traditional knowledge in this field. Our research, carried out in the capital of Ouagadougou and its surrounding areas (Central Plateau) and in the Hounde area (along the road from Ouagadougou to Bobo-Dioulasso, 255 km from the capital and 65 km from Bobo-Dioulasso), has tried to uncover this hidden knowledge and evaluate the impact of migration on it.

Women and Forest Products

This research concerns the relationship between migrant women and forestry resources. Its main objectives are:

- To discover and evaluate what migrant women know about the management of forestry resources,
- To study migrant women's behaviour toward forestry resources in the area where they settle, and
- To study the effects of migration on the transmission of this knowledge.

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[2]Monimart, M. 1989. Femmes du sahel, la desertification au quotidien; Karthala et OCDE/Club du Sahel Paris. p. 25.

The research techniques that we used are semi-guided discussions, discussions with individuals (in both cases using a short list of questions), and participant observation (visits to the bush and collection, processing, and storage of forestry products).

The notion of natural resources covers a very vast area. In fact, it includes all the resources that humans can use from nature. The main resources that are used by humans are: land, forests, fauna, etc. In this paper, we do not intend to examine all the natural resources. We are interested only in forestry resources such as fruits, flowers, wood, leaves, seeds, nuts, roots, etc.

In the two areas of research, we found that the ownership of land includes the ownership of trees. Because women cannot own land, however, they are not allowed to own trees either. One rather rare exception concerns trees on some fallow land and uncultivated bushland that is unprotected. In all other cases, women depend on men for the exploitation of forestry products.

In Burkina-Faso, as in most of the Sahelian countries, the degradation of forestry resources has been increasingly marked. Nevertheless, despite the social, cultural, and socioeconomic transformations in the Sahelian countries, forestry products are still vital for the people's livelihood.

These products are used in several areas: as food, for health, for energy, etc. Consequently, the continued degradation of the environment has been a tragedy for everyone. Women, however, have been affected most. In fact, because of their traditional social status as the main providers of food, women require forestry resources more and they, therefore, have had to continue using them to fulfil the needs of their families. The more resources become scarce, therefore, the farther afield they have to go and the longer it takes to get supplies. Thus, all year long, often assisted by their children (daughters) they go into the bush in search of forestry resources. Some of the products that are gathered are used for the daily preparation of meals, whereas others are used to treat diseases. The link between women and nature goes back to time immemorial, which means that women have an inestimable knowledge on the use of forestry resources.

Many people from the rural areas migrate to the towns (they are attracted by the facilities that are available and the hope of finding a salaried job) or they migrate to other greener, rural zones to flee the disastrous effects of the prevailing drought in the Sahel. Many of these people, among whom are many women, arrive in the new areas without any food. They look to the women to feed the families because of the knowledge they have in the management of forestry products. Thus, right from the beginning, each migrating family becomes a refugee of nature.

Although women are the main users of forestry resources, they are rarely consulted when projects for the regeneration of forests and bushland are being formulated. It is true that many women participate in these projects but, in most cases, they only execute what has been decided; all the background work is monopolized by men.

Worse still, an idea is spreading that women, because of their domestic activities (collecting forestry products) are the major agents of desertification. We do not intend to deny the damage done to the environment by deforestation, but women cannot be blamed for this situation. In our view, what is important are the socioeconomic conditions that have made firewood the only source of energy accessible to the majority of the people. Furthermore, by insisting on the harmfulness of their actions, might this paper not conceal the positive relations that women have with the

environment. In other words, can the relationship between women and the environment be analyzed merely in terms of desertification?

Based on this we can define our research assumptions more clearly. Women have vast knowledge that enables them to manage forestry resources efficiently. This knowledge is transmitted in an informal manner between members of the same family; from the older ones to the younger ones. Because of the scarcity of natural resources, however, this knowledge is used less and less and this aggravates the problems of desertification. Nevertheless, this knowledge contributes in improving, however little, the living conditions of migrants.

Unfortunately, the women who migrate to urban centres end up losing their knowledge because they cannot use it. Only those who sell forestry products manage to preserve some of the knowledge. Women who migrate to other rural zones also preserve their knowledge. In the majority of cases, they even increase their know-how by adding knowledge learned in the new zone where they settle.

Although the traditional management of natural resources used to safeguard the balance between human needs and nature's natural rejuvenation, the new methods of exploiting these resources (the ones used today) seem to be more of a battle with nature for human survival. In fact, because of a number of unfortunate circumstances (successive droughts, poor harvests, migration, runaway population growth) natural resources have been in higher demand than ever before. So the balance that used to exist has been upset. Consequently, there has been serious and persistent degradation of the environment.

This critical situation, however, has not changed the traditional role of the woman as the main provider of the family's food. So women's work has become even more arduous. They are the ones who suffer most when natural resources become scarce; the more difficult it is to find wood, the longer the distances they have to travel to find it. Without doubt, we can say that women understand the value of natural resources more than anyone else. Moreover, we discovered that women have traditional knowledge about the healthy management of natural resources, and they also know how to transform and use forestry resources. Most of the methods used by women to manage natural resources find their roots in the past. This means that even when natural resources were plentiful, there were still many rules and regulations about how to exploit them.

These rules and regulations were passed on through stories and sets of rules that were considered as taboos. This knowledge was informally transmitted from mother to daughter and from mother-in-law to daughter-in-law during evening gatherings when they were told stories relating to day-to-day activities. People respected the rules because, although the stories were supposed to make people aware of how to manage natural resources, the taboos and prohibitions were shrouded in threats of possible curses and even death for those who breached them. Thus picking raw fruits or cutting green trees were considered dreadful of fences; transgressors were threatened with being struck down by lightning.

Although today these rules and regulations are no longer respected (in the ecologically devastated areas), the women who break these laws live with a guilty conscience. In fact, almost all the women we interviewed believed that the droughts had been caused by the nonobservance of these taboos regarding the management of natural resources. It would seem that this is an

indication that traditional methods are disappearing because of the environmental crisis that has been caused by the overexploitation of natural resources. It would seem also that women are conscious of this but cannot do otherwise. In fact, the migrants in both the urban and the rural area are even more "attached" to natural resources than anyone else. The resources are used daily not only for the survival of the family (medical treatment, food, energy, etc.) but also for commercial purposes, to enable these poor families who normally have no other source of income to meet their basic needs.

Because of their rural origin these women know a lot about the management of forestry resources. Those who have migrated to another rural area have the opportunity of applying their knowledge, and even adding to it. We can say too that even women who are used to using devastating methods (on nature) can revert to using healthy means of managing natural resources as soon as the conditions are right.

Women, therefore, plunder nature against their better judgment, but they have to do it for the sake of survival. This is the case of the rural women who migrate to towns. Although they too have knowledge about the healthy management of natural resources, they cannot apply it. Because of population pressure, resources are scarce. The migrant women have to depend on these resources because they have no formal training that would enable them to earn reasonable salaries. Moreover, because they are migrants, the families are often poor. They have no land or animals or money. They settle at the edges of towns and use forestry products for food, for medical treatment, and to earn money to buy basic necessities that nature cannot supply. We also discovered that, although it is more difficult to get supplies of medicinal plants, a large proportion of the population (80–100% in the rural areas) often use forestry resources for this purpose.

Recommendations

The findings of our research, as summarized in the foregoing, have motivated us to formulate a series of practical recommendations that can be used by government and nongovernmental organizations to improve the food security of women (and men) in rural and urban areas. These recommendations are the following:

Government

Land Ownership

- Initiate a process that would finally give women the same rights to land ownership as men (this would include ownership of trees found on the land).

Reforestation

- Because women have much knowledge about the management of forestry resources, they should be given their rightful place when issues on reforestation are being discussed. They (as much as men, or even more) should be consulted when programs are designed.

- Given that indigenous species are very useful and women have wide knowledge on how to exploit them, every effort should be made to plant these species.

- People should be encouraged to start plant nurseries to provide seedlings that can be planted in and around the urban centres to curb the process of desertification, and also make it easier for women living in urban areas to have access to forestry resources.

- The promotion of energy-saving stoves should be intensified and poorer women should be assisted in getting them.

Traditional Medicine

- Intensify all efforts that deal with the use of medicinal plants by giving guidance and support.

- Initiate training sessions for traditional practitioners to teach them the basic rules of hygiene so that there is less risk of contamination when products are administered. Also teach them how to improve the appearance of the products they put on sale.

- Demand that strict rules of hygiene be adhered to at the selling points and help the women traders to improve their preservation methods and the quality of their products.

- Strive to establish collaboration between the Ministry of Health and the traditional practitioners.

- Allocate small pieces of land to women and guarantee them the right to use the medicinal plants that they grow on this land; such plantations should make it easier to supply the urban centres with medicinal plants.

NGOs

In Burkina-Faso, NGOs work very closely with the grassroots communities. They are constantly in the field, so very often they know the people well. We, therefore, make the following recommendations:

Reforestation

- Women should be involved in defining the objectives of reforestation programs.

- Traditional practices that can help in reversing the process of environmental degradation should be identified and programs formulated.

- Campaigns to promote the use of improved stoves should be supported.

- Income-generating projects for women should be identified and executed so that the plundering of forestry resources for commercial purposes can be reduced.

Traditional Knowledge

- Legitimize the traditional knowledge that women have and show how important it is by conducting public awareness campaigns.

- Make the women in the urban areas aware of the forestry products that are available (karite butter, soumbala) and that they are usually more healthy and nutritious.

Traditional Medicine

- Support the training and improvement of traditional practitioners.

- Help to improve the preservation of plants and hygienic conditions at selling points.

- Initiate and encourage projects for growing medicinal plants at the edges of towns as well as in the countryside.

Women's Welfare

- Particular attention must be paid to women in the urban areas. In fact, these women who live around the edges of the towns usually do so in conditions of abject poverty. They are often overlooked by women's organizations in the urban or rural areas as well as by development projects.

- Identify and set up projects to improve these women's living conditions; for instance, they could be involved in projects for growing medicinal plants.

- Make it possible for women traders who deal in forestry products to get loans.

An Overview of Food Systems Under Stress: Research/Action Issues and Needs in East Africa

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Abstract *Despite general improvements in global food availability and in health and social services, hunger and malnutrition continue to devastate the majority of the world's poor. The picture is especially grim for the developing world but it is even more so for sub-Saharan Africa where the population growth rate continues to surpass the growth in agriculture. Although many of the features highlighted in this paper cut across most countries, there are those that are unique to East Africa. In no order of priority, the problems that continue to cause food insecurity are: erratic and unfavourable weather conditions often resulting in prolonged drought, lack of technological advancement in food production and processing, negligence of the more adaptable traditional food crops, crumbling economies, structural adjustment reforms, a faster population than economic growth rate, an overdependence on the female population who do not have the necessary skills or proper infrastructural support to produce food, and inappropriate policies and lack of implementation and follow through by governments on those policies that are appropriate and viable. Out of these problems emerge further areas of research. Research should ensure that integrated approaches are used and that all the stakeholders, such as policymakers and communities, are involved at all stages of the research process. This calls for a different reorientation altogether on the part of researchers who will now need to assume more of an advocacy role.*

The International Conference on Nutrition (ICN), held in Rome in December 1992, jointly sponsored by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO), and other donor and development agencies adopted an extensive review process of existing information and various aspects that determine nutritional well-being. The reviews that formed the background material for the Rome Conference were thorough and my presentation draws considerably on much of the material that was made available to us at that Conference. The presentation also draws on my own experiences in the field of food and nutrition both on the African continent and elsewhere.

There is no doubt that despite general improvements in global food availability and in health and social services, hunger and malnutrition continue to devastate the majority of the world's poor. The picture is grim for the developing world and more so in sub-Saharan Africa where the population growth rate continues to surpass the agricultural growth rate. The sight of starving and severely malnourished children depicts the very tragedy of Africa. All this is the reality of a continent plagued with a multiplicity of problems that can be summarized as being due to both natural and human-made calamities. Although many of the features in the region cut across most countries, there are unique features about East Africa that will be highlighted here.

Food systems are supported by crop and livestock production and by exploitation of such resources as land, labour, cash income, inputs, credit, and time. The foregoing scenario is supposed to support a food systems structure that can maintain and enhance the well-being of the populations in question:

- Industrialized countries have small agricultural populations and surplus capacity for food production and are mainly interested in protecting the environment (Hopkins 1986).

- Developing countries are still struggling to supply food to their rapidly growing populations. These countries are more interested in increasing production and productivity.

- Economies of most African countries are agriculture dependent. Most populations are rural based and, therefore, draw their livelihood from natural resources.

Anything that negatively affects the foregoing situation is in effect putting stress on the food systems and can thus threaten people's livelihoods. Disasters, whether caused by humans or natural occurrences can stress food systems resulting in diet changes, food aid, food sharing from relatives, food loans, the sale of labour for mainly menial jobs, small animal sales, productive assets sales, land leases, land sales, and out migration. All these factors constitute survival strategies aimed at coping with stressed food systems and, therefore, threatened livelihoods. Chambers (1988) defines livelihood as "...adequate stocks and flows of food and cash to meet basic needs. Security refers to secure ownership of or access to resources and income earning activities, including reserves and assets to offset risk, ease stocks and ease contingencies. Sustainable refers to the maintenance or enhancement of resource productivity on a long-term basis."

Food is a fundamental need and, as such, provision of it is increasingly being viewed as a human right. Good governance should include ensuring that everyone has access to enough food, both in terms of quantity and of quality to maintain a healthy and active life.

Hunger and Malnutrition in Africa[1]

Cause 1

Africa's woes are partly caused by harsh climatic conditions, as most economies are agriculture dependent on largely rain-fed farming systems. A considerable part of the continent is arid or semi-arid. Drought is experienced in cycles and is usually harsh and widespread. The two latest droughts, one in 1984 and one in 1990–92, swept across most of the continent and brought into focus the risks of food shortage created by reliance on rain for agricultural production.

Changing weather patterns have often had a destabilizing effect on farming communities resulting in unpredictability that heightens farmers' vulnerability and anxieties. What normally arises out of these scenarios are emergency food crises that can only be contained by food relief in the form of imported food aid. Recovery from these situations takes a long time. Inevitably, overreliance on food aid detracts from development efforts. In addition, in any normal year, negative seasonal effects have an influence on food availability in much of Africa.

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[1]The sequence of the presentation of these causes is not in any order of priority.

Cause 2

Lack of technological advancement in production and processing is an issue of real concern. In production, traditional practices are still the order of the day, as land-surplus farmers carry on with shifting cultivation while smallholders continue to apply traditional methods of crop production. For example, many still broadcast their seed and fail to use improved seed or to apply fertilizer or pesticides.

On the livestock side, high meat- and milk-yielding breeds of cattle and other livestock are kept by very few farmers, extension services to oversee animal health are inadequate, although free-range grazing is still preferred despite diminishing land available for such use. The result is continued underproduction of food whether it be crop or livestock. Nonmechanization of the farming sector also continues to make farming unattractive for the unemployed educated young people.

Cause 3

The area of postharvest food management requires urgent attention. It is a major problem everywhere on the continent. Estimates by FAO continue to put postharvest grain losses at 30-50%. In many cases, this is an underestimate. Worse still, these are losses on below-optimal yields. There exist traditional food preservation methods that are efficacious to indigenous varieties of cereals, for example. New varieties require different forms of treatment. In any case, most farmers hardly ever apply these traditional grain-preservation methods. In cases of bumper yields upon adoption of modern farming packages, farmers require information and assistance on the diversification of usage. Often, such assistance is lacking, causing the farmer to despair and subsequently abandon the new technology. In East Africa, community-level food storage and processing initiatives, such as the ones found in West Africa, are lacking.

It is not uncommon to find a farmer having harvested a bumper crop, selling at distress prices only to have to purchase food later at exorbitant prices. Many farmers do this to preempt food spoilage and to generate what may be their only source of income. In Tanzania, a national program on food storage at the farm and community level is being supported by the United Nations Development Programme (UNDP). Sasakawa G-2000, which is a nongovernmental organization (NGO) supported by the Sasakawa Ship Company of Japan and is involved in food security initiatives in a number of African countries, is improving on the traditional grain store in a number of Tanzanian districts. Such programs to improve on-farm storage practices have also existed in Kenya in the past. To ensure success of these programs, it is important to involve farmers fully from planning to implementation.

Cause 4

Emphasis on crop types is an additional issue to consider. The orientation has conventionally been to provide research, credit, extension, and marketing support for such exportable cash crops as coffee, tea, cotton, and so on.

Although in a number of countries such as Kenya, attempts have been made to strike a balance between food and cash crop production, activities have tended to favour the latter. With increasing populations and diminishing landholdings, it has become clear that different types of policies and practices are required to increase food yields to meet the demands. Food crops need attention more than ever before. Currently in Uganda, food crops are being promoted as cash crops as well. Uganda is in fact having a second chance at development. Most African economies cannot afford food imports as their conventional cash crops are no longer as lucrative on the international market as they used to be. Worse still, most soils on which food crops are grown are poor and do not receive fertilizer to replenish fertility.

There are certain crop types that do well in various ecological zones, yet, one always finds crops being grown in most unsuitable zones. An example is when maize is grown where sorghum would do better. In such cases, proper extension advice is often lacking; coupled with this is the fact that people's food habits have changed. They, therefore, choose to grow what their palate is currently used to. It appears that research and extension services have tended to ignore the more ecologically adaptable crops in terms of:

- Proper crop management practices
- Seed development and production
- Development of easier and less labour-intensive processing practices
- Pricing and marketing aspects
- Utilization promotion campaigns

It is obvious that a revolution in food production, similar to the Indian Green Revolution in the 1970s, is unlikely unless certain farm practice packages are adopted by farmers. What cannot be ignored, however, is the fact that most farmers in Africa are poor and small-scale. The packages being advocated include extension services on proper farm management, sufficient inputs in terms of fertilizer and pesticides where necessary, improved seed, and use of cost-effective practices, such as animal traction. Much of this support used to be subsidized by most governments. With pressure to adopt structural adjustment reforms, however, subsidies are being removed, forcing the prices of these services upward.

Cause 5

Structural Adjustment Reforms have had different types of impact in those countries where they have been enforced. David Budhoo (1993) an exstaff member of both the World Bank and the International Monetary Fund, who resigned in protest, has since established an NGO of reform to force change within the two organizations. He writes "Food security has declined dramatically in all Third World regions but in Africa in particular. Growing dependence on food imports which is the lot of sub-Saharan Africa, places these countries in an extremely vulnerable position. They simply do not have the foreign exchange to import enough food, given the fall in export prices and the need to repay debt." The main aim of Structural Adjustment Programs (SAPs), it appears, according to Budhoo, is to reduce corruption in developing countries and redivest resources for

exports on the repayment of debt. There is no doubt that devaluation of currency increases inflation and hikes the prices of all imported foodstuffs and of locally produced foodstuffs as well. While the World Bank and IMF prepare to mark their 50th anniversary next year, it is estimated that 1.2 billion people in the Third World now live in abject poverty, and over half of sub-Saharan Africa children are starving or malnourished.

Some 1.6 billion people in the Third World are without potable water. In some countries of Africa, infant mortality rates are double what they were 10 years ago. It appears with SAPs that the situation has become worse. It is because of agencies such as the United Nations Children's Fund (UNICEF) that the World Bank has begun to portray any sensitivity at all toward the plight of the world s poor.

A number of countries following SAPs continued to pay out substantial portions of their already meagre export earnings to creditors, undermining any gains attributable to reforms and threatening the incentive to sustain those reforms. One only has to travel through the rural areas and poor urban areas to agree with Budhoo's sentiments. In Kenya, where SAPs have recently been adopted in a substantive way, the Kenya Shilling has been devalued a number of times in only 6 months, causing inflation and interest rates to sky-rocket. This has, of course, hurt business and reduced people's purchasing power.

A considerable percentage of previously middle-income households have been pushed to the low-income bracket. Kenya's economy and lifestyles which used to be envied in the region, are now hurting. The currencies in the neighbouring countries are fast gaining strength against the Kenyan Shilling.

Cause 6

The rate of population growth in sub-Saharan Africa is causing ripples in the economy. The region's average rate of population growth at 3.1% puts undue pressure on an already difficult food and environmental situation. Unless people are made to understand the need to exploit and conserve, preserve and regenerate the environment at the same time, the impact of settlement can be irreversibly destructive. Additionally, high population growth without an attendant increase in economic growth has a negative impact on the environment. Overutilization of inhabited high-potential land, destruction of water catchment areas, encroachment on forest land – all these are common scenarios. Throughout sub-Sahara Africa, agricultural production continued to stagnate, due to factors that include soil degradation and deforestation (Global Coalition for Africa 1992).

Cause 7

It is often said, and it is true, that the bulk of food producers in Africa are women. This in itself would not be anything to complain about except that women are already overburdened with too many other responsibilities related to reproduction and home and child care. Women often do not receive the necessary extension and credit support, and women hardly ever apply modern technology processes to improve food yields. So long as this continues, food production in Africa will remain below potential.

Women's health is also a matter of concern, making it difficult for them to be consistent in their role as food providers. Because of the many constraints, women food producers continue to limit food concerns to their immediate family needs. Women are expected to be not only concerned about their reproductive and nurturing roles, but they should be environmental managers as well. There is, obviously, a need to modify this trend so that energetic young men can participate fully in Africa's food production sectors instead of waiting for "white collar," urban-based employment, which is becoming more and more difficult to access.

Cause 8

Policies in much of the developing world have contributed immensely to the slow pace of economic advancement. Many policies, although with good intent, have been ill-conceived, often by foreigners who do not understand the contextual framework within which they are operating. Some policies have lacked sensitivity toward the poor, and have instead promoted actions favouring the rich, who make up an insignificant percentage of most of these populations.

It is important for policies to provide an environment that favours agricultural production; improves people's purchasing power and, thus, improves food consumption; and that generally favour the majority of the poor. Another problem with policies is that they may sound good on paper but are useless if they are not implemented. Existing policies need to be assessed in terms of their viability, i.e., to what extent do they support efforts to enhance food security and the eradication of hunger and malnutrition?

Only eight causes have been highlighted here. They represent a very small part of the problems that continue to plague Africa. Africa is a continent of diversity and is rich in unexploited land and resources. Above all, her people are the most important resource. There is a need to harness these resources in an effective manner, involving, to a large extent, the African peoples themselves, if much headway is to be made toward socioeconomic recovery. The question now is how can research funding organizations participate effectively in this process? What should organizations' areas of focus be, given that resources are diminishing the world over?

Research Needs

There is a place for research. The research should no doubt be action oriented and problem solving. Interdisciplinary programs that address the crucial problems facing Africa: rising population, stagnating agricultural production, increasing environmental destruction, and a deteriorating human resource base, would be more efficacious. Obviously, not all problems can be solved at the same time, however, certain problems need to be tackled in an integrated manner for any demonstrable impact to be realized. For now, priority areas appear to be:

- Utilization of existing technologies and knowledge to improve food yields – there is a need to find out what appears to be the problem with adoption. Technologies are there in production, processing, utilization, and in time saving and even in woodfuel saving. On the fertility control side, although most young families say they want to

have fewer children than their parents had, and know of at least one family planning method, few of them are using any method of birth control at all. Why have available technologies not been widely adopted?

- Commercialization of agriculture by making farming more attractive for the educated through appropriate mechanization, improving the marketing and pricing aspects, making farming profitable, encouraging large-scale landholders to lease out land, and providing soft credit for commercial farmers. This measure by itself would immediately reduce unemployment among the productive lot of young men and ease women's responsibilities in the rural areas. There is also a need to develop opportunities in off-farm employment to enhance the cash base within communities and households.

- Exploitation of the underutilized natural resources. The forests are being destroyed rather than exploited, the whole area of fisheries is treated as a supplementary aspect, whereas marginal lands, which would be very productive if properly managed have been largely avoided. There is obviously a need to redirect research efforts toward these areas.

- Organizations, such as Canada's International Development Research Centre (IDRC), are well known for their institutional capacity-building efforts. The process IDRC undertakes in project development and monitoring imparts invaluable skills that stay with the institutions and the people the organization works with. There is obviously a need to continue in this direction.

- The area of collaborative research across institutions and disciplines is one that should be supported by donor agencies. It is not an easy approach but it is cost-effective and stands a better chance of solving problems than single approaches. It is possible that integrated interventions tried in the 1970s failed because they did not benefit from appropriate research back-up data.

- There is now general consensus that if one wishes to succeed in development efforts, one needs to involve the community fully. The term "community participation" has, however, been used more theoretically than practically. The term needs to be redefined in a functional manner. People's participation means empowering them and enabling them to articulate their own problems and to devise appropriate solutions. Easy options do not exist, whereas imported ones fail because of their inappropriateness. It is important to take the time and enter into a dialogue with the community to ensure that adequate community consultation and participation in any project that is finally implemented.

- Work needs to be done in the area of linkages to establish a continuous food chain. Currently, researchers do their work and keep it on shelves in their institutions without passing it on to extension workers, extension officers continue to use obsolete information that, in fact, puts them behind the farmers they are supposed to serve; whereas the farmers continue to be disillusioned by lack of properly coordinated attention from extension workers. These linkages are necessary to enable everyone to end up in the farmer's field with all their innovations, having involved the farmer in all the processes. This approach is being tried in Uganda under a United States Agency for International Development (USAID) funded program and is reported to be making considerable headway, and it will ensure that the small-scale farmer, man or woman, will receive the necessary support to maximize food production within their limits. There is a need to study this aspect with a view to designing modalities for strengthening the links.

Areas of research that have been suggested are quite general. Thus, any donor agency can fit in any of them and identify specific areas of operation. There is obviously a need to continue supporting research in Africa, because there is hope for recovery. A lot has been learned from past mistakes, and the picture for future direction is clearer now. The need for a problem-solving approach is more crucial now than ever before if the natural resource base, which constitutes the livelihood of most populations in Africa is to survive for now and for the benefit of future generations.

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Food Crises and Transformation in East Africa: (Re)Searching for Viable Food Security Alternatives

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Abstract *This paper discusses the recurring food shortages and famines in East Africa. The objective is to contribute to developing a research agenda on this subject by (a) demonstrating that the food situation in East Africa has been deteriorating over the years; and (b) reviewing the approaches to understanding the recurrence of famines and food shortages in East Africa with a view to deriving issues and themes for research.*

Food Shortages, Famine, and Food Relief

A record of food shortages and famine highlighted in the following demonstrate the extent to which East African countries are food insecure. Beginning with Uganda, the semi-dry area of Karamoja has witnessed repeated experiences of fatal famine and food shortages. One observer noted that Karamoja has been partially surviving on food relief since 1964 (Alnwick 1985). In 1966, Karamoja, together with the districts of Acholi, Bugisu, Bukedi, and Sebei were recipients of food relief owing to the food shortages that followed the 1965/66 drought (Nyangabyaki Bazaara 1991).

In 1969/71, there occurred yet another drought that left some areas of Amuria, Karamoja, Kiryandongo, Teso, Usuk, etc., with food shortages (Seruyidde and Asoka 1969). Once again famine relief had to be mobilized. The worst crisis, however, was the 1980 famine in which an estimated 30,000–40,000 people of Karamoja perished. During that year, Uganda imported a record of US$ 44 million worth of food and animal products (Royal Tropical Institute 1984, p. 14).

In 1984, there were widespread shortages of food with part of the cause being the civil war. Once again, many places survived on relief food from Oxfam and other nongovernmental organizations (NGOs). In 1989, a famine occurred in West Nile and relief food was distributed to the starving. Given this trend, one can not but conclude that the food situation in Uganda has been insecure and will, in all probability, worsen in the years to come.

Turning to Kenya, famine and food insecurity have been a persistent feature of its northern dry and semi-dry sectors. Food relief has been of major importance in averting starvation; for example, Eliot Fratkin reports that:

> The drought of 1961 attracted some 11,000 Turkana to famine relief camps. Twenty years later, following the drought of 1980, some 80,000 Turkana, nearly one-half of the District's population of 169,400, sought famine relief as over 90% of their cattle, 40% of their camels, and 80% of their small stock died (Fratkin 1991, p. 120).

In the 1960s, expensive irrigation projects were established on rivers such as the Kerio and Turkwell. It was said then that this would tremendously increase the food security of the Turkana. The effect, however, was overcrowding, overgrazing, and further food insecurity (Hogg 1987). In 1980, there was yet another serious effort that sought to go beyond administering food relief and

to lay a foundation for sustained food security. This effort materialized as the Turkana Rehabilitation Project funded by the European Economic Cŏmmunity (EEC) and the Netherlands. This project based on the "food-for-work" principal of the World Food Programme has only institutionalized food relief (Adams 1986). At least the records available indicate that up to 1985, 15,000 people were on food relief, the number having dropped from 80,000 in 1982.

Besides Turkana, there have been other areas such as Baringo, Isiolo, Kitui, Maasai, Pokomo, etc., which have continued to live with uncertainty regarding food supply. Once again, international organizations have established projects for food security; for example, the World Bank in Baringo and the Overseas Development Administration (ODA) in Isiolo (Moris 1987). Like the Turkana case, these strategies have failed to exorcise the ghost of famine. Instead, it has been alleged that politicians have been manipulating famine relief to increase the numbers supporting them (Berry, 1993; Weekly Review, October 16 and November 6 1992). Table 1 shows the amount of foreign exchange both Kenya and Tanzania spent on food imports in the 1970s (Bothomani 1984/85).

From the end of the 1960s, Tanzania increasingly experienced food deficits that were covered by imports. The crisis built up in the early 1970s and drew the attention of the World Food Conference of 1974 (George 1988, p. 30). Yash Tandon documents that in 1974/75 Tanzania imported 446,000 tons of maize, rice, and wheat and paid 783.1 million Tshs for it. Smaller quantities of food aid also came from relief organizations such as the Catholic Service (which distributed 17,389,000 lbs of food, worth some US$ 3,442,000 in 1975/76), and World Food Aid, which distributed 8,043 tons of Maize, 552 tons of maize meal, and 182 tons of oil in 1974 alone (Tandon 1978) (see Table 1). We do not have the figures for later years but at least Philip Raikes documents that in 1980/81 Tanzania imported 300,000 tons of food (Philips 1988, p. 193). The trend seems to have continued.

Bothomani Isaac came to the conclusion that "Tanzania still has to import large quantities of foodstuffs: dairy products and eggs, cereal and cereal preparation, and miscellaneous food. Food shortages, minor or serious, occur in Tanzania more frequently than elsewhere in East and Central Africa" (Isaac 1984/85).

Table I. Food Imports 1969—1977 for Kenya and Tanzania (US$1,000).

	1969	1970	1971	1972	1973	1974	1975	1976	1977
Kenya	22,064	28,717	43,242	44,818	47,466	46,912	36,902	32,932	28,812
Tanzania	20,199	23,849	24,378	42,840	37,362	146,020	13,568	47,681	62,717

Note: See Bathomani (1984/85); Barker (1989).

There have been attempts in the past to come to terms with famine and food shortages described in the foregoing. For us to avoid the mistakes of those attempts and to build on their insights, it is essential that we review the existing stock of knowledge on the subject. It should be noted, however, that this review is by no means exhaustive. It is hoped, however, that this attempt will serve as a foundation for a more comprehensive review of the literature.

Surplus Theory to "Dualism" Theory

East Africa emerged from colonialism with a "dual" agricultural sector. There was the so-called modern sector as well as the traditional. The former specialized in producing for the export market, whereas the latter specialized in the production of food, allegedly on a "subsistence" basis. The postindependence project aimed at modernizing the traditional sector, and modernization was assumed to be a unilinear, cumulative, irreversible process. Because of this assumption, the traditional sector (which mainly produced foodstuffs) would sooner or later disappear as forces of modernization took root. This affected the type of research that was mounted and the questions that were posed. The focal point was the modernization sector, and virtually no attention was given to the traditional sector. There was no attempt to analyze the dynamics of the traditional sector to see the forces that undermined it.

The assumptions of the modernization perspective, however, go way back into the history of Western theory involving conventional liberal economists and orthodox Marxists. The problem that they passed on was that any social system that was not capitalist was described in terms of what it was not, not the "modern," and the modern was capitalism. The orthodox Marxists called any system not capitalist as "natural economy," whereas the liberal economists called such a system "subsistence."

Both the Orthodox Marxist and the conventional economists shared assumptions about how the natural economy or the subsistence system worked (Nyangabyaki Bazaara 1993). First, the major activity of the subsistence or natural economy was food production for household use. Second, that economy was driven by the logic of self-sufficiency, which self-sufficiency was in turn equated to food security! Third, the subsistence system was characterized by abundant labour and land. Finally, this system was based on egalitarian access to resources.

These assumptions about the nature and functioning of the noncapitalist (or subsistence or natural) economies were recast into the "vent for surplus theory," which was concerned with providing an ideological basis for colonial-enforced export crop production without transforming the labour processes. According to the theory, land and labour were plentiful and, therefore, the introduction of export crops could not in anyway undermine the production of food crops.

All precolonial African societies were deemed to have had surplus labour and land that required a "vent" and that vent was found in the production of exports or sale of labour. Resistance to production of export commodities was seen as "laziness," or preference for leisure and not the producers reasoned assessment of the real constraints.

The main point here is that this ideology continued to give an impression that all noncapitalist societies are food secure. In turn, there was no problematic for research because food security or insecurity was not an issue.

The assumption that noncapitalist societies were food secure was incorporated into the postsecond world war dualism theories of the modernization perspective. These assumptions continue to influence much of the theorization about the food crisis in Africa with disturbing results. The best example can be gleaned from Jamal Vali's writings on Uganda. Using the very concept of subsistence, in 1988, Jamal Vali claimed that Uganda remained "food self-sufficient" in the years of economic and political breakdown, because food is produced on the basis of subsistence and the subsistence system is driven by the logic of food self-sufficiency, which in turn means food security.

He further argued that the political and economic crises only affected the monetary sector, which means that the peasants went back to their leisure, long recognized by the colonial officers, although some peasants could have devoted more time to producing foodstuffs. From this, the conclusion was that Uganda has always been food secure (Jamal Vali 1987, 1988)! The policy implication of Jamal's analysis was that the system of subsistence should be maintained. In terms of research, no issues could arise from his analysis because food insecurity was not the issue. But Jamal Vali is not the only one with such assumptions about African agriculture.

From "Dualism" to "Uncaptured" Peasantry

We can use another example of Goran Hyden (Hyden 1980, 1983). Hyden had certain assumptions about the African peasantry. First, they produce food on the basis of subsistence. This subsistence production continues because land is plentiful, which makes peasants "food self-sufficient" (food secure). In turn, this food security makes these peasants powerful and able to evade capture by other social classes and the state. To Hyden, the crisis of development in Africa was traceable to this self-sufficient peasantry.

Hyden differs from the modernization perspective only in as far as he recognizes and articulates the fact that this "subsistence" system is not operating in a political vacuum. But he shares the same assumptions about noncapitalist societies with "vent for surplus" or "dualism" theories. The shortcoming is that his sense of history, with its specificity, is circumscribed. How does one account for the food crisis and the chronic importation of foodstuffs in Tanzania? Critics pointed out that it was not true that peasants have been self-sufficient or food secure as he argued (Nelson 1986; Staudt 1987; Nyangabyaki Bazaara 1993).

Second, the history of villagization in Tanzania leaves his theory of a weak state, weak indeed. If the Tanzanian state was that weak, how did it manage to move millions of peasants? Finally, like the "vent for surplus" theory or "dualism" theory, Hyden could not see that the peasantry were differentiated, a fact that raises serious issues for any discourse on food security. Without a grasp of inequalities in access to resources or inequalities in control over productive resources we can not understand how food security and insecurity are reproduced.

Food security flows from the agrarian structures and it is within the dynamism of these structures where food security or insecurity is reproduced. Let us illustrate our point by examining some of the consequences of the Structural Adjustment Program (SAP) on the Ugandan peasantry. This program deprived the peasantry of its social income that assumed the form of subsidized medicare and education.

On the one hand, faced with a social crisis of school fees or sickness and without any other source of income, many poor peasants sold their land at distress prices. This is a loss of productive resources. On the other hand, the buyers are land speculators residing in towns whose interest is fighting inflation by keeping their cash wealth in real estate. This means that more and more land is accumulating in unproductive hands with long-term implications for the viability of agricultural production.

We should add that the peasants are forced to pay taxes, to provide free, unpaid labour (for the good of the nation). These peasants operate in commodity markets that are severely depressed; it does not matter whether the state intervenes in the markets or not. Because agriculture does not pay, the propensity is to invest all the surplus into trade. Everyone in East Africa knows that trading is more lucrative than farming. Agriculture stagnates and a simple drought deteriorates into food shortages or famine. There is inequality in access to productive resources, which should be acknowledged as a starting point of any investigation into who starves, who eats, and why. No correct policy for strengthening food security can succeed unless developed against this rural dynamic.

Thus, a peasant with a small uneconomic piece of land is vulnerable to starvation even with the simplest drought. The rich peasant or capitalist, however, may have more than enough resources to produce or procure adequate food. The world of the poor peasant is that of food insecurity, whereas that of a rich peasant or capitalist is that of food security.

The problem, however, is not simply differentiation internal to the peasantry but also that "subsistence" producers continue to lose resources to the modernizers. This process has been going on as far back as colonial days. In all the three East African countries, land tenure was modified and sometimes concentrated in only a few hands — white settlers in Kenya, plantation owners in Tanzania, or Mailoland landlords in Uganda. It is also fairly well known that a lot of land was taken over for game parks ranging from Tsavo in Kenya, through Serengeti in Tanzania, to Kidepo in Karamoja. We also know that many large-scale projects were established, such as the Masaai wheat scheme in Kenya and the Group Ranches in Kenya (Galaty 1993). In recent years, all these countries have witnessed absentee land grabbers from towns.

These forces pushed the "subsistence pastoralists or cultivators" into marginal lands, crowding them, the result of which was environmental degradation in areas such as Nakivale, Rakai, Karamoja, Northern Kenya, etc. (Hogg 1987). Alternatively, many "subsistence producers" have been transformed into squatters or tenants with serious political implications. For instance, in 1989 there was a serious political crisis in Masaka District of Uganda between absentee landowners and squatters.

Underdevelopment/Dependency

A serious challenge to dualist models came from the underdevelopment/dependency perspective. The argument was that the traditional/modern dichotomy was not original in reflecting the natural development of society. Both sectors were created in a single history, which brought these societies into the orbit of the world capitalist system.

Furthermore, the relationship between the "modern" and the "traditional" sectors was not harmonious, it was contradictory, and the prosperity of the modern had something to do with the crisis of the traditional sector. The recurring famine or food shortages were a product of the "traditional or subsistence" sector's loss of resources to the modern. Moreover, the participation of peasants in the world market as raw material producers led to their loss of surplus through unequal exchange. This undermined the capacity of the peasants to produce food crops.

This approach, however, suffered from a number of shortcomings. First, it emphasized international exchange to the neglect of internal exchange relations. Second, the accumulation process, i.e., the differentiation of the producers was ignored. Consequently, the power relations, the politics of agriculture, and how these reproduced the stagnation could not be captured by this approach.

Monetarist and the Urban Bias

In recent years, there has been a resurgence of the neoliberal, monetarist approach championed by the World Bank and the International Monetary Fund (IMF). This approach saw the food crisis as emanating from the urban bias, the unequal exchange between the rural and urban areas. This approach also concentrates on the internal factors and deemphasizes the dependency school's external focus. This means that the source of the problem is the state, which distorts the operation of the market purposely to appease the volatile urban groups. The intervention, the policy mistakes, have been the keeping of overvalued exchange rates, which made imported food stuffs cheaper than the locally produced ones. Cheap food imports hurt the farmers by reducing the market for their food crops. Furthermore, the state intervention in the market via parastatals or direct administrative action depressed returns to the producers.

The effect of these state actions is that the peasants cut back on production, or could not innovate with new technology. Therefore, the solution is to roll back the state and "put the prices right." This move has resulted in measures that have led to privatization of parastatal marketing boards and a reduced state involvement in the economy (Banugire 1989; Cheru 1989); however, there are some erroneous aspects in this perspective.

First, this perspective erroneously assumes that the market is a neutral arena governed by forces of supply and demand. It fails to see that markets are social constructs as well, or in the first place. This means that even when the state has been rolled back, there is no guarantee that the peasants will get a fair deal for their work. It is indeed utopia to think that when the state has been forced to withdraw from the market that the urban bias will then be extinguished in favour of a rural bias. This is because "free" markets are "free" only for the strong, and the strong

in East Africa are still in the urban areas.Besides, putting the prices right can only benefit those peasants with resources to produce tradeables.

As noted, the countryside has not remained stagnant; the peasantries are differentiating. Putting the price right means that only those with resources to take advantage of increased prices will reap the benefits of liberalization. The response of the producers will depend on the land, the labour, the bicycles, the stores, the oxen, the hoes, etc., available to them. Besides, price is not a good measure of whether or not a peasant is getting a fair reward for his or her work. The World Bank and IMF deny that the peasants in Africa are differentiated and that putting the price right will not lead to inequalities (food security for some and insecurity for others). The truth is that this is not so and any research agenda must recognize the unequal access to productive resources and go about finding out how producers lose resources and, in the process, undermine or strengthen their food security.

The monetarist perspective gained in the late 1970s as the world economy plunged into a recession. Almost contemporaneously, the rational choice perspective reemerged challenging some of the arguments of the monetarists view of the Third World crisis. The rational choice (mainly Bates 1981) perspective agreed with the monetarists that the intervention of the state in the economies of the Third World had distorted the market and that this had acted as a disincentive to peasant production. But it went further, to argue that state interventions in the market were not mistakes but rational actions of the politicians. What was politically rational was not necessarily so in economic terms.

To Bates, governments usually adopt policies that are politically rational to enhance their legitimacy, particularly to appease the volatile urban groups who want cheap food. This, plus the revenue imperative, explained governments' distortion of agricultural prices. Rational choice theory is certainly an advance over the "market" theories. The problem, however, is that rational choice theories remain trapped within the assumptions of neoclassical economics that inform the monetarist perspective.

After providing reasons why governments make policies that are economically irrational, the solution remains the same: "encourage market forces." Besides rational choice perspective ignores the actual historical process through which food is produced and distributed. Such an approach can not help us to understand concretely how other factors conditioned choices and, in the process, undermined food production or promoted it. As Bates himself has recently admitted "the critics are right. 'Rational Choice theory' has largely ignored the role of history" (Bates 1993).

Research Questions and Themes

The foregoing should have indicated the methodological and conceptual problems that need to be overcome to understand the food crises in East Africa and how to transform production processes to achieve food security. The capacities to produce food have been changing as a result of external factors, such as the state programs, commodity prices, as well as internal differentiation. This differential access to productive resources in turn can not simply be assumed but must be grasped through concrete research. Besides, different areas were subjected to different pressures

and history so this diversity of experience need not be buried under blanket concepts such as subsistence. No durable food strategy will be found without researching into this diversity and concretely finding out what it is that make particular regions or social groups vulnerable to famine or food shortages. The questions that arise, therefore, are:

- What forces have been responsible for food crises or their absence in East Africa and how can these forces be reshaped to create new capacities to reproduce food security?

- Who will be the agent of social change: agrarian capitalists, middle peasantry, the state or the market?

- What technological and organizational forms will this entail and what crops will be grown?

East Africa is characterized by varying ecological and farming systems. It is, therefore, important to focus on the major farming systems in East Africa.

- *Pastoralism and agropastoralism:* An examination of changes in the manner in which the pastoralists access productive resources, the changing character of their access and control, the manner and extent to which these resources are being taken by agriculturalists/private capitalists and how these processes affect food security, and the quality of the natural resources base.

- *Agricultural food crop production:* Changes in the farming systems, in access to resources (land, labour, market, etc.,) and how this feeds into famine and food scarcity.

Evaluating Past Food Strategies

One area that needs attention is the assessment of the past strategies designed by East African governments to achieve food security. Virtually every country in East Africa has been talking about policies designed to enhance food security.

In 1981, Kenya came up with Sessional Paper No. 4 on National Food Policy (Mwangi et al. 1987). In Uganda, every year the budget documents reassert that "government policy for agricultural development continues to focus on the increase of food production for self sufficiency and diversification of the agricultural exports" (Republic of Uganda, Recovery Programme 1982–84 and Background to the Budget 1988–89, 1989–90). In fact, the Government of Uganda invited a team of international consultants to design a food strategy! In its 1984 report it noted that "discussions with the food strategy team, and notably with the European Economic Community (EEC) and the World Bank on principal policy and institutional issues have been positive. General agreement exists on strengthening the system of incentives, food and agricultural producer prices" (Towards a National Food Strategy 1984).

A number of projects could be cited as having been justified as "food security projects." For example, the ranches in Uganda were justified as a crucial step in ensuring self-sufficiency in livestock products. In Kenya, for instance, there are a number of projects, such as the Masaai Wheat Scheme, the Turkana Project, etc., which were justified as projects aimed at strengthening the food security of the country. In Tanzania, after the 1974/5 food crisis, the Tanzanian government, together with the World Bank, initiated a "National Maize Project" for food security in Tanzania. There have been other projects such as the NAFCO Wheat Project (Lane 1992). The point is that evaluating past strategies may reveal theoretical, conceptual, and empirical shortcomings from which lessons can be derived. The questions are what strategies have these countries adopted to ensure long-term food security? Which strategy worked and which ones failed? Did these strategies undermine food production and distribution or strengthen them. What was the impact of these strategies on, for instance, the environment? What lessons can be drawn from that experience?

Since the 1980, East African governments have come under severe pressure from IMF and the World Bank to undertake reforms believed to stimulate food production via price incentives, appropriate exchange rates, etc. It is now more than 10 years since this decisive program began. What has its impact been on the food security of the people? Who has become more vulnerable and how?

Food aid or relief has been used extensively by NGOs during all these past food crises. There has been talk that food aid can indeed be used to strengthen the food security of the vulnerable through food for work. For example, it has been argued by FAO that "Food donors are re-orienting their approach so as to help African countries lay the foundation for long-term food security through both producer price support and consumer price stabilization." What has been the impact of food aid say on the Turkana (Demery and Addison 1987)?

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Food Crisis and Strategies in Rwanda

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Abstract *Food insecurity is a very serious problem in Rwanda. Agriculture, which is the main source of national income, and the provision of food in general are under stress. Agricultural production is unable to satisfy the (increasing) demand for food. During the 1980s, and especially since the 1988–1989 famine, a large part of the population is suffering from chronic food shortages. To develop sustainable and equitable food security strategies, two major constraints must be considered: the explosive growth of the population and the rapid degradation of the soils. Overpopulation contributes to overexploitation of arable land, which leads to soil erosion and loss of fertility. At the same time, farmers do not have the financial means to invest in soil improvement. Research has an important role to play in developing a demographic and agricultural policy based on sustainable and equitable use of available land.*

This paper presents a case study of the food strategy and food crisis in Rwanda. To address the issue of food systems under stress in Rwanda, we must mention the one million people who have been displaced by the civil war of October 1990. These people, who have been forced to leave their land, homes, and other belongings behind, have been suffering for more than 3 years already, especially in terms of food supply. Hundreds of children, pregnant women, and the elderly have died. Today, with the peace accords of Arusha and the return of the people to their homes, we hope that the country can now deal with its development and rebuild what has been destroyed by the war.

Unfortunately, the fighting has not completely ceased in this African subregion of great lakes. The war continues to kill people, this time not in Rwanda but in neighbouring Burundi where a military coup has caused the massacre of thousands of people. The direct consequence of this war is that 500,000 persons have sought refuge in Rwanda resulting in enormous additional pressure on food demand, which is already too high under normal conditions. Now, to guarantee the security of people and their belongings and to be able to develop a research and action plan for a sustainable food security at the local, national, and regional levels, we need a democratic state and political stability, in other words, a democratic development process.

Rwandan Agriculture

Agriculture forms the basis of Rwanda's economy. It consists of food crops and export crops (primarily coffee and tea). Farming is the major source of income for farm families (some 95% of the population). The lion's share of food production is consumed directly by farm households, i.e., subsistence farming. A small fraction of output is surplus that is sold at local markets to feed the urban population. This is the primary source of cash income for farm households.

The output of industrial crops (coffee, tea, pyrethrum) is destined almost entirely for export. It constitutes the country's main source of foreign exchange and generates cash income for peasant coffee growers. Tea production, unlike coffee, is in the hands of the government. The production

of food crops falls into four main sectors: bananas, cereals, legumes, and tubers. The relative importance of each varies according to area, primarily as a function of altitude and rainfall. The government is advocating crop regionalization with the aim of intensifying agricultural production.

In recent years since 1980, however, agricultural output has been dropping steadily, and the shortfall has been increasing. In consequence, the rural population has joined the urban population in having to import significant quantities of food, specifically cassava, beans, and sorghum. Such products are traded from one part of the country to the other (hill, commune, prefecture), or are imported from neighbouring countries: Burundi, Tanzania, Uganda, and Zaire.

Short-Term Food Demand and Supply

From independence until 1988, food production seemed adequate, albeit irregular with supply more or less following the demand curve. In quantitative terms, the availability of food per inhabitant does not seem to have suffered under the weight of population growth (Table 1). In terms of nutritional quality, however, there is a sharp food imbalance, with a marked shortfall in animal proteins, fats and certain vitamins (Vis et al. 1975).

A significant food shortfall became increasingly apparent from 1988 on, even in quantitative terms. This resulted in famine (official documents use the euphemistic term "scarcity"), which hit the country hard and caused many deaths.

The primary reason for this was the unusual weather conditions of 1988 when heavy rains were followed by severe drought, the effects of which were felt throughout 1989 and in subsequent years. When we surveyed the population by means of interviews on this topic in the community

Table 1. Increase in food production 1962–1986. (Annual rate of increase in percentage.)

	1962–70	1971–80	1981–86	1962–86
Legumes	8.8	1.2	10.4	6.0
Cereals	6.9	2.8	9.3	5.2
Carbohydrates	2.8	7.0	0.3	3.9
Bananas	31.1	2.3	11.0	11.7

Source: Ministry of Finance and Economics. 1987. L'économie rwandaise: 25 ans d'efforts (The Rwandan economy: 25 years of effort). Kigali, RW.

of Nyokizu, Butare Prefecture, on behalf of Oxfam, we were told that the famine was comparable to the Ruzoyoyura famine of 1943–45. The difference was that the seriousness was less apparent this time and the damage was limited (in terms of loss of human life) by the relative ease with which food could be distributed (an extensive infrastructure of good roads and means of transportation, supplemented by international food aid). The statistical survey of the economy (Cahiers Economiques du Rwanda No. 4) describes trends in agricultural output and the problem of food self-sufficiency for the four food crop categories as follows, for the period 1988–90 (Planning Ministry, Rwanda 1992, pp. 42–43).

Legumes

Overall production of legumes rose by 9.1% in 1989 over the 1988 figure, which was down 6.4% from the previous year. The increase was only temporary, however, as output fell by 12.5% in 1990. The increase in production in 1989 resulted from increases in the output of peas (48.3%) and beans (7.8%). Output of both crops declined significantly in 1990 (by 35.8 and 10%, respectively) accompanied by a 44.4% drop in peanut output.

Cereals

Cereal production increased by 10.9% in 1989, compared with a 1988 decline of 6.9% over the previous year. This increase was a result of a significant increase in output of sorghum and rice, along with a parallel decrease in 1989 in other products, namely maize, finger millet, and wheat. Sorghum output increased by 32.7% and rice by 69.2%, whereas maize, finger millet, and wheat declined by 18.1, 5.9, and 2.2%, respectively. Because the declines did not involve large amounts, the increase in sorghum and rice production resulted in a net increase in cereal output.

The production increase did not continue in 1990. That year, the irregular rains in the major producing areas resulted in a significant drop of 14.4% in cereal output. The most severely affected crops were rice and sorghum, which recorded declines in production of 22.4 and 46.9%, respectively.

The decline in rice production, which had been noted over several years, was temporarily halted in 1988–89 by positive growth rates. This improvement did not, however, last, as the situation again deteriorated in 1990, when output dropped by 46.9% over 1989. Rice production activities suffered from the many problems in the rice-growing industry: quality, management of irrigation water, plant disease, and high production costs.

Tubers

In 1989, tubers, the second most important crop after bananas, registered the largest rise (19.3%) in comparison with other categories, following a drop of 11.1% in 1988 over the 1987 figure. The increase in tuber output in 1989 was due primarily to an increase in potato production. The increase in cassava production (21.9%) also had a considerable effect. Sweet potato production increased by only 3% as output was limited by a shortage of cuttings. Output of taro and yams remained essentially steady, with a slight rising trend for taro, matched by a decline in yams.

The situation deteriorated further in 1990. Tuber output dropped 11.2% because of a decline of 41.9% in cassava and 4.6% in sweet potato production, in the wake of a proliferation of diseases affecting these crops and the ongoing shortage of sweet potato cuttings. Taro output increased in consequence (91.2%) as a substitute for these two commodities. Potato production increased slightly (by 3.7%).

Bananas

Banana production increased by 2.8% in 1989, after declining by 6.5% in 1988, as a result of an improvement in weather conditions for crops in the producing areas. This rate of growth continued in 1990, as a result of particularly favourable weather conditions and continuing efforts to combat disease; 1990 output was 18% up from 1989.

Risk of a Chronic Food Crisis

Agricultural production has recovered somewhat after the famine of 1988–89. Unfortunately, the effects were mitigated by the war of October 1990. Fighting took place in the volcanic lava region, which is a major potato-producing area and, in the Mutara region, which has become an important source of food supplies, specifically rice and livestock, since it was developed.

These cyclical factors (weather conditions, war) affecting agricultural production are compounded by structural problems, specifically low yields as a result of overexploitation and soil deterioration. This is corroborated by Cahiers Economiques du Rwanda:

> Total agricultural output in 1991 increased because of continuing favourable weather conditions affecting the producing areas as a whole and a decline in crop diseases. Yields nevertheless declined in several areas as a result of erosion and soil deterioration (Planning Ministry, Rwanda 1992, p. 42).

Relative self-sufficiency in food has been possible for some time now as a result of a strategy of bringing new land into production and reducing the amount of land lying fallow. With the exception of the swamps, almost all the reserves of arable land are now under intensive production and traditional farming methods are accordingly no longer capable of meeting the nation's food requirements.

Because of the constantly increasing population, demand for food is also increasing, but the resources, in terms of available arable land and extensive agriculture, are lacking. We are witnessing a steady drop in the size of family farms. Although the size of the average family farm was estimated by the Belgian authors of the 1950 10-year plan at 2.88 ha, this had sunk to 1.20 ha, according to the 1984 National Agricultural Survey (Ministry of Agriculture and Livestock Raising, Rwanda, 1984, p. 69).

This is, however, merely an average as in reality a growing number of households farm less than 0.50 ha. It is often, moreover, more appropriate to regard them as landless peasants because their farms do not produce enough to meet their subsistence needs. They live below the poverty line and either hire themselves out as labourers to other peasants with larger farms or look for

small, nonfarm jobs to survive. Others simply choose to emigrate to neighbouring countries, whereas others resort to outright begging. In short, close analysis reveals that the food crisis of 1988–89 was an indicator of the precarious nature of Rwanda's food self-sufficiency.

Those prefectures most affected (Butare, Gikongoro, and Kibuye) are unquestionably the areas that have habitually suffered from chronic food shortages. Unfavourable weather conditions merely aggravate the latent food shortage.

What is very serious, however, is that this situation is spreading to other regions of the country or, at the very least, to certain classes of the population in normally self-sufficient areas. The deterioration in the food system is, therefore, both qualitative and quantitative:

> Despite our finding that overall calorie supply is adequate to feed the population...a large number of households lack sufficient calories. The poorest households are, on average, far below what they need in terms of available calories.... [and] ...these food shortages are chronic for a large proportion of the population (Loveridge 1992, p. 31, 35).

Research Project On Sustainable Food Security

The food challenge in the medium, and especially in the long term, is common to all of Sub-Saharan Africa, undoubtedly with some aspects that are peculiar to Rwanda, and demands new strategies to deal with it. The World Bank Report, entitled "Sub-Saharan Africa: From Crisis to Sustainable Growth," explains the challenge in these terms:

> More and more Africans are going hungry. Severe food shortages were exceptional in 1960; now they are widespread. It is estimated that about one-quarter of Sub-Saharan Africa's population — more than 100 million people — faces chronic food insecurity. Expanding food production is essential — the target is 4 percent growth a year — although that will be adequate only if food trade within Africa is also liberalized. This rate of growth would be enough to feed the growing population (2.75 percent a year), improve nutrition (1 percent a year), and progressively eliminate food imports (0.25 percent a year) between 1990 and 2020. An improved supply is not enough; the purchasing power of nonfarm families will also have to be sufficient. With the rising level of employment proposed in the target scenario, the number of low-income households unable to afford an adequate diet would gradually decrease. But recurrent droughts will continue to cause famine for a residual core of the poorest. For this vulnerable group, sharply targeted food subsidies or food-for-work programs will be needed, supplemented by direct feeding programs for malnourished women and children (IBRD 1989, p. 6).

Strategies for a fair, sustained growth in output are absolutely essential if we are to tackle this problem of hunger effectively and respond adequately to the inexorable rise in the demand for food. Two major variables must be taken into account to achieve this: exploding population growth and accelerating environmental degradation.

Medium-Term Sustainable Food Security Research Project

In the case of Rwanda, a research project has been initiated, led by a multidisciplinary team, with support from Canada's International Development Research Centre (IDRC). Its primary objective is to see what kind of strategies can be implemented by a hungry rural population in a densely populated area to combat hunger through the sustainable development of the resources available in the local human and physical environment.

Rwanda is not only the most densely populated country in Africa (over 280 inhabitants per square kilometre, in relation to total usable farmland), its birthrate currently surpasses the world record (birthrate 5.2%, mortality 1.8%, growth 3.4%). The August 1978 national census recorded a population of 4,819,317, whereas the August 1991 general census of the country and its population recorded more than 7 million, with the prospect of reaching 10 million by the year 2,000 (Republic of Rwanda 1984). In light of the population situation, one of the major problems facing Rwandan agriculture is the amount of farmland available for cultivation. Given the limits on available farmland, research will focus on the peasants' land use, their choice of crops, and farming methods.

Subsequently, the research will attempt (specific objectives) to see how the population and the local authorities perceive the problems of hunger, how they attempt to respond to these problems (convergent or divergent approaches), to see to what extent these solutions are compatible with sustainable management of the available resources:

- Highlight the rural population's ability to innovate in response to famine; and

- Highlight opportunities for increasing incomes through farm and nonfarm activities that are compatible with environmental conservation.

Research Project On Long-Term Sustainable Food Security

Based on the research findings at the local level, on the peasants' farms and with the peasants, agricultural and food (macro-socioeconomic) strategies will be developed at the national and regional (eastern Central Africa) levels for the long term. To achieve this, it will be necessary to create an appropriate research framework in which researchers, decision-makers and other principle social and economic players work together in developing an agenda of priority themes and goals and developing strategies to achieve them:

> A long-term perspective of sustainable growth with equity in Sub-Saharan Africa is correctly concerned with economic policy goals and improving the efficiency of policy instruments. It should also consider political developments and the environment in which economic objectives are specified and pursued and the political processes and institutions that produce the national agenda, which would explain why past goals were not achieved and why the instruments employed failed or were prevented from functioning fully (Tarr 1990, p. 32).

Conclusion

Taking into account the environment under stress, we can no longer use the available natural resources without any long-term planning and management. It is of crucial importance, therefore, to develop policies and strategies in the agrofood sector that promote viable and sustainable food security as well as conserve our natural resources.

Rwanda, is confronted with the interrelated problems of increasingly less fertile arable lands and a growing population. To solve these problems, we urgently need to develop modern agricultural techniques that are adapted to the agroecological conditions of the country. We must also establish a close collaboration among all the social actors involved: farmers, researchers, technical experts, politicians, and administrators.

To achieve equitable food security, agrofood policies and strategies should give priority to rural households. Farmers, who are the principal actors in the agrofood sector, should be the principal beneficiaries of agricultural development.

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Food Systems Under Stress in Southern Africa: Agenda for Research and Action

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Abstract *Southern Africa is sufficiently well endowed with natural resources to offer food security to its 80 million inhabitants. The food, agriculture, and natural resources sectors face problems of food production–population imbalances; lack of employment; household, national, and regional food insecurity; and environmental degradation. But, to get agriculture moving, nations must invest in five prime movers: technology, human capital, physical and biological infrastructure, effective institutions, and favourable economic and policy environments. In this paper, food security is defined and research results from the region summarized. Action to get agriculture moving must focus initially on encouraging political support for agriculture and empowering smallholder farmers and institutions in land reform and food security policy and going beyond structural adjustment to embarking on development strategies.*

Southern Africa, over the last decade, has been a region full of hope and optimism with respect to the food, agriculture, and natural resources sectors. The region has also been devastated by recurrent drought culminating in the severe drought of 1992. Civil conflicts in Angola, Mozambique, and South Africa have also dampened the optimism.

Southern Africa is made up of 10 countries[1] of wide variation in their abilities to achieve national and household food security and combat poverty and environmental decline. It is, therefore, important to account for these and other differences in ecosystems, political structure, and histories as we draw general conclusions. This paper focuses on the 10 states in the Southern Africa Development Community (SADC).

The food, agriculture, and national resources (FANR) sector of SADC is strategic to the economies because the majority of the estimated 80 million people live in rural areas. This sector contributes an estimated 35% of the regions' gross national product (GNP), employs up to 80% of the total labour force, and accounts for 26% of the total foreign exchange earnings. In member states that are not dominated by mining, FANR contributes about 60% of total foreign exchange.

The SADC region is well endowed with basic resources of land, labour, and water for agricultural production, broadly defined to include crops, livestock, forestry, fisheries, and wildlife. Out of a total arable land base of 477 million ha, 5% is under crops, 41% range land, 33% forests and woodland, and 21% is currently considered unsuitable for agricultural use given available technology and market conditions (SADC 1992). In Lesotho and Malawi, however, most of the land has been brought under cultivation. Botswana is carefully considering the environmental implication of opening new land for irrigation. Zimbabwe and Namibia face problematic land inequality problems.

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[1]Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia Swaziland, Tanzania, Zambia, and Zimbabwe are the 10 countries of the Southern Africa Development Community (SADC). A postapartheid South Africa is expected to be the 11th member state.

On average, SADC member states have produced about 10 million tonnes (mt) of cereals a year over the last decade. The region still faces chronic difficulties in meeting its cereal requirements and the deficit for 1991/92 was estimated at 2.8 mt with a decade average deficit of 2 mt. This deficit rose to a record of 6 mt in 1992/93.

Livestock is a major activity in the region. In 1989, the region is estimated to have held approximately 32 million cattle, 15 million sheep, and 17 million goats. The distribution of the livestock, however, is uneven with two countries accounting for 64% of all cattle (Tanzania 44%, Zimbabwe 20%). Sheep and goats are the most important small stock in the region. Goats have added economic significance in Lesotho for mohair, and sheep in Namibia for Karakul.

The SADC region covers an area of 5.7 mkm^2, equivalent to 17% of the African continent. About 4.8 mkm^2 is land surface, whereas 0.9 mkm^2 is made up of inland water systems. Most countries in the region have considerable areas of land that are neither arable nor forested. Although not productive in terms of agriculture, these range- and wildlands have great importance for livestock, wildlife, and conservation.

Plant resources include forest, woodland, savanna, and grassland, which cover 61% (i.e., 2.9 mkm^2 of the SADC region. Approximately 0.25 km^2 of this land has been set aside especially for forestry purposes. Indigenous, closed forests are quite limited, including a relatively small area of moist forest in northern Angola, and mountain areas in Malawi and Zimbabwe. Forest–savanna mosaics occur in Angola, Malawi, Zambia, coastal Tanzania, and in riverine and coastal Mozambique. Dry deciduous forests are common in northern Botswana, Malawi, south-western Zambia, and western Zimbabwe. There is a narrow strip of mangroves along the Zaire (Congo) river in Angola and the coasts of Mozambique and Tanzania. Grasslands occur in Lesotho, Malawi, western Swaziland, along the Angola–Zambia boundary, and in Zimbabwe. Although the region as a whole is self-sufficient in commercial, indigenous, and plantation wood resources, fuelwood resources are becoming increasingly scarce.

Almost 16% of the SADC region is inland water surface (i.e, 0.9 mkm^2). This makes up the support system of a very important fresh water fish resource. Apart from this, the region has more than 5,000 km of coast-line with a 200 mile limit that extends into the sea and, therefore, supports an even more important marine fish resource. The total fish production in the SADC region exceeds 926,000 tonnes/year of which about 65% originates from marine fisheries and 35% from inland fisheries and aquaculture.

Wildlife of the SADC region is of exceptional diversity. Of Africa's 84 species of large herbivores, for example, more than half are found in the region; some of them in spectacular numbers, others less conspicuous. The more arid savanna zone contains very important populations of game animals. These have become particularly well-adapted to the arid and often agriculturally marginal environment. They have traditionally furnished the rural population with meat, skins, and other raw materials. As agricultural expansion has progressed, wild animal populations have come more and more into conflict with human endeavours.

In large parts of the region, the large indigenous herbivores have and are still being replaced by cattle. The greater part, however, of the semi-arid savanna woodlands of Angola, Mozambique, Tanzania, Zambia, and Zimbabwe and the arid thornbush steppe of Botswana still

support significant game populations. Wildlife-based tourism is of particular economic importance to Botswana with 37%, Zambia with 30%, and Malawi with 11.3% of total area set aside for this purpose.

Major Problems

Food Production–Population Imbalance

Rapid population growth is increasing the pressure on food supplies and the natural resources base, including fisheries, fuelwood, and grazing land for wildlife and livestock. In many SADC states, growth in population and income will demand that food supplies grow at 4–5% per year; an awesome task in the light of historical evidence. For example, the few countries achieving these rates of growth of food production have brought large areas of idle, undercultivated land under production and intensified irrigation. Moreover, few countries have achieved, and sustained, 4–5% annual growth rates for the agricultural sector as a whole for a decade or more. For example, from 1880 to 1960, the annual compound rate of growth of agricultural output was 1.5% in the U.S. and 1.6% in Japan.

In short, rapid population growth necessitates that expansion of efficient food production be one of the cornerstones of food security strategies in SADC. Food aid can help to fill the food gap as it did in India for 15 years, 1956–71. In the final analysis, however, each member state must develop a cost-effective strategy to ensure food availability through local production, storage, and trade.

Lack of Employment in Rural Areas

On average, 7 out of 10 people are living in rural areas in the region. The majority of the people will still be living in the rural areas by the year 2000 because of the inability of the industrial and service sectors to generate adequate jobs. For example, in the 22 low-income countries in Africa, the labour force in agriculture fell by only six percentage points (84–78) over a 16-year period, from 1965 to 1981.

Rural employment generation will be as important a challenge in the 1990s as expanding food production had been during the 1980s. SADC's food and agriculture strategy must address the following employment question: What can be done to help school leavers, redundant workers in mining and parastatals, and returning miners from South Africa find productive employment in agriculture and rural nonfarm activities until population growth declines or industrial expansion creates more urban employment opportunities? This challenge requires far-reaching programs to bring more land under cultivation, increase the productivity of land currently in use, promote rural growth points and market towns, and employment-intensive industries and long-term public works programs. These programs can fulfil the objectives of providing jobs, increasing the purchasing power to acquire food, and developing rural infrastructure.

In summary, the emerging employment crises requires a medium- and long-term perspective because the newcomers to the labour force in year 2000 are already born. Close cooperation

between industrial and agricultural planners is required to develop policies and programs that concentrate on increasing the rate of agricultural growth and spreading employment opportunities throughout the rural economy.

Household Food Insecurity

An estimated 25% of SADC citizens are hungry or malnourished or both. There is great divergence between national levels of household food insecurity, and this issue will be discussed further later. The thrust of SADC's food security strategy is clear, research on food crops and investment in food production and storage are essential but not sufficient vehicles for solving malnutrition and household food insecurity problems. The reduction of poverty is a central part of a strategy to reduce food insecurity and malnutrition. Rural income and employment generation, food aid, and public feeding and public works programs are important components of the strategy to tackle malnutrition and food insecurity among the poor, the underemployed, and the sick.

National and Regional Food Insecurity

From 1980 to 1993, SADC's main concern has been getting food and agriculture programs moving, with the aim of reducing food dependence on the world at large. Changes in the world food economy and international capital markets dramatise the need for SADC's agricultural strategy to be continually modified in the context of changing international realities. National and regional food insecurity can originate from drought and national, regional, and international economic forces, including the following:

- Natural disasters such as drought, floods, and diseases and pests;
- Blockages and disruption in transport routes; and
- Shifts in international prices of food imports and export crops.

Because SADC economies are open and heavily dependent on international trade for food imports, such as wheat, and for exports, such as beef, cotton, coffee, and tea, it follows that national and regional food insecurity can originate in sudden and unpredictable shifts in commodity prices and increases in foreign exchange requirements for food imports. Research on international commodity markets is a crucial input into national and regional food policy analysis. The challenge is to design cost-effective national and regional food security policies to combat a given level of risk associated with drought, pests, e.g., locusts, transport disruption, and international price movements. To anticipate rather than respond to changes in the world food economy, SADC will require assistance from its cooperating partners to help increase its policy analysis capability as part of the strategy to develop local capacity in economic management.

Environmental Degradation

Evidence from a wide range of scientific studies indicates that sustained overuse of biological systems can lead to a cascading effect that is difficult to reverse. The loss of top soil,

tree and grass cover from increasing human and livestock pressure is now a fact of life in the region and in other parts of Africa. For example, livestock numbers in Africa have increased 75% from 1950 to 1983. In a number of SADC countries, fuelwood consumption is now running far ahead of tree growth. There is, therefore, a need to address the problems of environmental degradation in the region. and implement measures to preserve natural resources and a healthy environment. But these measures require sound economic analysis and close cooperation between specialists in ministries of natural resources and of agriculture.

SADC states recognize the need for a strategy of conservation for sustainable development. Thus conservation is defined as the management of human use of the biosphere with a view to deriving the greatest sustainable benefit for the present and future generations. Conservation within the region is faced with the following priority problems: reduction in quality and quantity of agricultural areas and grasslands; accelerated soil erosion and land degradation; overgrazing and desertification; extinction of species, subspecies, and varieties; loss of support systems of fisheries and wildlife; and inadequate institutional and operational mechanisms essential for land-use planning.

Getting Agriculture Moving

Why have the food and agriculture sectors of Africa done so poorly over the last three decades. There is now enough evidence to suggest that Africa, compared with say Asia or Latin America, is only at the early stages of human, scientific, and institutional, development. Looking back to the beginning of Africa's independence in the late 1950s and early 1960s, African nations, with the assistance of Western donors and the council of Western economists, gave priority to promoting basic industries and taxing agricultural exports to finance industrialization and urbanization (Rukuni and Eicher 1991). This was basically an attempt to skip stages of development and "catch up" with the industrialized nations. Africa is today paying a price for not investing in the prime movers of agricultural development.

In spite of the urgency of Africa's agricultural crisis, there appears to be no shortcuts to intensifying, on a long-term basis, investment in the prime movers of agricultural development. Five basic prime movers must work together to achieve sustainable agricultural development:

- New technology produced by public and private investments in agricultural research.

- Human capital in the form of professional managerial and technical skills produced by investments in schools, agricultural colleges, faculties of agriculture, and on-the-job training and experience.

- Sustained growth of biological capital (genetic and husbandry improvement of livestock herds, crops, forests, plantations, and so on) and physical capital investments (large and small dams, irrigation, grain stores, roads).

- Improvements in the performance of institutions, such as marketing, credit, research, extension, and land reform.

- Favourable economic policy and political environment (Eicher and Rukuni 1986).

Worldwide experience has shown that no single prime mover, such as new technology or higher prices, can increase agricultural production and sustain it for any period of time. Another significant characteristic of prime movers is their long gestation period (10 to 25 years).

Hindsight tells us that over the last three decades African nations and donors should have pursed development rather than growth strategies. The more current experience with structural adjustment programs in Africa also suggests that attempts to stabilize economies without a deliberate policy to bolster long-term investments into prime movers will not "get agriculture moving." The initiative to strengthen Africa's human capital and institutional base for smallholder agriculture must emerge from Africa. The routine tailoring of African strategies to changing trends of donors over the past 30 years must be put to rest.

Food Security Research[2]

SADC has adopted the following definition of food security:

> Food security is defined as ensuring that all members of a household, nation or region have access to an adequate diet to lead an active and normal life.

Food security, according to Rukuni and Eicher (1987), has two essential elements: food availability and food access. The University of Zimbabwe/Michigan State University food-security research, therefore, addressed both sides of the food security equation. Food availability can be achieved through domestic productivity, storage, trade, food aid, and so on. Access to food is achieved through home production, purchasing on the market, and through food-transfer programs. For purposes of research, food security was defined at three levels: household, national, and regional. At each level, a set of issues and problems were addressed. Major findings and conclusions of research within Southern Africa are (Rukuni and Bernsten 1988):

- Poverty is considered the major cause of hunger, malnutrition, and environmental damage.

- The relationship between hunger and economic growth is important in developing food security policy. This is because even though economic growth is the ultimate cure for poverty and hunger it will take a long time to achieve such levels of economic growth. African governments in the short run have the duty to ensure that nationals

[2]Research results summarized here are mainly from the University of Zimbabwe/Michigan State University research project on Food Security in Southern Africa.

are not starving needlessly. In this regard, the problem of hunger is not confined to the agricultural sector alone. Rural nonfarm employment is a vital element in the ability to acquire food. There is also increasing evidence that as rural infrastructure and markets develop, cash crops increase household incomes and their ability to acquire food.

- Rural households are not homogenous entities. Even in high-potential areas and in good agricultural seasons hunger and malnutrition may persist in chronic food insecurity.

- Although food crops are a major source of income in most areas studied, remittances, livestock sales, and wages from nonfarm labour are important income sources. The level and composition of these sources varies greatly between households and regions.

- Marketed surplus varies considerably between years, regions, and households. In favourable rainfall years, marketed surpluses stretch the capacity of government and private trades to store, and dispose of, these surpluses.

- In drought-prone regions, government sponsored food-for-work and other food-transfer programs are an important source of food security for the most at risk.

- Unreliable rainfall is a major source of risk. Interyear yield variability is extremely large, even though farmers have adopted coping strategies such as staggered planting, intercropping to reduce risk, etc.

- Household labour is a major production input. Labour is, paradoxically, in limited supply given demands of improved farming methods. Compared to urban wages, returns to labour in agriculture are low.

- Market controls and restrictions more often than not depress producer prices, hinder movement of grain, and discourage rural traders.

- Parastatal marketing is geared to purchasing and storing food centrally, but is ineffective in distributing food to deficit regions and households.

- At the regional level, intraregional trade is negligible, mainly because of nontariff barriers. This means that even if the region is self-sufficient in aggregate terms, some nations still face severe food insecurity problems.

Agenda for Action: Lessons from Zimbabwe[3]

Mobilizing Political Support for Agriculture

Zimbabwe's agricultural development experience provides some valuable lessons and insights for policymakers and donors in Southern Africa, South Africa, and the rest of Africa.

Agriculture is treated differently in the political process in the industrial countries than it is in most countries in Africa. This issue is of fundamental importance in understanding agricultural stagnation in many countries in Africa. With few exceptions, agriculture is heavily taxed in most countries in Africa and used as a national parking lot for the poor. At the same time, governments have generally reinvested only a token amount of the tax revenues extracted from farmers back into rural institutions, infrastructure, and villages. By contrast, virtually every industrial country subsidizes its farmers and urban consumers, donates food aid abroad, and still has a chronic problem of farm overproduction. For example, the accumulation of agricultural surpluses in Japan, the United States and Western Europe has been fostered by farm commodity groups with enormous political power (e.g., rice farmers in Japan, grain producers in the United States and livestock producers in Europe).

A high percentage of new African governments from 1960 to 1990 have been dominated by top-down military and industrial and urban political coalitions. Most organized farm groups have been excluded from the political arena, and farmers have been taxed to generate public revenues to support the army, highly visible social services, and a barrage of government beer, textile, and bicycle factories. The extent of the tax burden imposed on agriculture in Africa and other Third World regions is staggering. A recent World Bank study of 18 Third World countries over a 25-year period (1960–84) revealed that the average tax burden on the agriculture sector was 30% (Schiff and Valdés 1992).[4]

If African farmers are excluded from the political process, who will make the case in the national political arena for rural schools, higher farm prices, year-round feeder roads, rural electrification, and modern colleges and faculties of agriculture? The first generic lesson that emerges from Zimbabwe's two agricultural revolutions is that farmer-led initiatives have been crucial to Zimbabwe's agricultural success.

Today, Zimbabwe has two farm organizations — the Commercial Farmers Union (CFU) and the Zimbabwe Farmers Union (ZFU).[5] By contrast, in many other African nations, farm

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[3]This section draws heavily from Eicher and Rukuni (n.d.).

[4]Schiff and Valdés (1992) report that the average total taxation (direct and indirect) of agriculture in three African nations included in their study was as follows: Cote d'Ivoire, 49% for 1960–82; Ghana, 59.5% for 1958–76; and Zambia, 46.3% for 1966–84.

[5]The Zimbabwe Farmers' Union (ZFU) was formed in 1991 through the merger of the Zimbabwe National Farmers' Union (ZNFU) and the National Farmers' Association of Zimbabwe (NFAZ) (see Bratton 1991).

organizations are kept on short tether by the ruling party. Food and agricultural policy in Africa will continue to be dominated by the interests of urban, industrial, and military coalitions if farmers and farm organizations have little voice in the political system.

In summary, agricultural revolutions worldwide have not been simple technocratic exercises. Rather, political support for agriculture has been an essential ingredient. The policy lesson for nations in Africa is the need to encourage farmers to develop farm organizations and make the case in the political arena for public investment in agriculture and rural communities. Why are donors so reluctant to help farmers establish farm organizations and encourage increased farmer participation in the political process in Africa?

Land: Putting People to Work

Experience in Zimbabwe and other countries has shown that smallholders can be competitive with large farms if they have political support, access to technology and efficient farmer support services, incentive prices, and market outlets. Two important dimensions of the land question in Zimbabwe have not been adequately addressed in the current debate over land.

The first issue is the economic justification for a smallholder agrarian structure to replace Zimbabwe's dual agrarian structure over time. The economic case for land reform and a smallholder-dominated agrarian structure is supported by empirical evidence "that small farms generally have a higher value of output per unit of land and capital than do large farms" (Dorner 1992, p. 23).[6] Binswanger and Rosenzweig (1984) have shown that small farms are generally more efficient than large farms because family members receive a share of the profits and, therefore, have more incentive than hired workers to work hard. Also, there are no hiring and search costs for family labour and, unlike hired labour on large farms, each family member assumes a share of the risk in smallholder farming.

The second issue that should receive more attention in current debates is the role of land policy in rural employment generation. Because of rapid population growth, the agricultural and rural nonfarm sectors will have to provide jobs for up to 75% of all newcomers to Zimbabwe's labour force in the foreseeable future. Land reform for smallholders is appealing because it can help meet the challenge of putting more people to work in rural areas. This issue is of strategic importance to policymakers because the absolute size of the rural labour force will increase over the next two to three decades. But there is a large gap between the theory and practice of a smallholder road to development. The following discussion reveals that there are complex problems involved in developing efficient farmer support organizations to assist hundreds of thousands of smallholders.

National Food Policies

Southern Africa is now probably the most organized region when it comes to national and regional food security. Food security at the regional level is becoming more feasible as

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[6]See Berry and Cline (1979), for empirical evidence of the inverse relation between farm size and productivity in Asia (India, Pakistan, the Philippines) and Latin America (Brazil and Colombia).

governments develop national food policies. Botswana clearly took the lead in the early 1980s and, eventually, in 1985, promulgated a National Food Strategy white paper that lay down a permanent mechanism for dealing with hunger and malnutrition. This strategy allows Botswana to support up to 60% of its 1.1 million people through various food transfer programs and, in particular, to deal with recurring drought.

A number of other countries in the region have now developed national food-security policies, in particular there is Malawi, which has probably the most advanced national nutrition-monitoring mechanism. The experience of the 1992 drought demonstrated that SADC was prepared for self-help through commercial imports as well as an effective food aid program. This is demonstrated by the record $850 million assistance program and a record 6 mt of food moved into and within the region in a little over a year avoiding a potential calamity.

Cash Crops and Food Buying Power

Zimbabwe's smallholder cotton success story adds important empirical information to the ongoing debate over the role of food and cash crops in African development. Many academics and members of the donor/PVO community contend that cash crops are the "mother of poverty" and that they exacerbate hunger by diverting land and labour from food to cash crops. For example, Walter Rodney's (1974) widely read polemic "How Europe Underdeveloped Africa" makes a powerful case against producing cash crops for overseas markets. But yesterday's experience is not an adequate guide for making current policy decisions on whether to produce food, or cash crops, or both.

There is now solid empirical information in many African countries that cash crops such as cotton, cut flowers, and horticultural products can help improve the lives of smallholders. Clearly, cotton has helped thousands of poor farmers in Zimbabwe increase their food buying power, pay for school fees, and finance investments in oxen and equipment that has been useful in producing food. But it would be irresponsible to lay down a blanket policy guideline for, or against, cash crops in Africa. What is needed is a case-by-case analysis of the social, political, and economic dimensions of cash cropping. Rodney's blanket contempt for cash crops should be replaced by a pragmatic assessment of the likely economic and social impact of each cash crop on a country-by-country basis. There is growing evidence that cash crops can play a positive role in increasing the food buying power of poor farmers.

Strengthening the Rural Service Institutions

The Zimbabwean success with smallholder agriculture after independence is solid evidence of the pay-off to effective service institutions, particularly marketing, credit, research, and extension. By providing these services, which had been denied smallholders before independence, smallholders outstripped large-scale commercial farmers in maize and cotton production. Zimbabwe thus proved that both large- and smallholder farmers can be dynamic forces in national development.

The Zimbabwean experience with institutions, however, also exposed some of the inexperience and lack of capacity in providing effective service to smallholders. Thus credit, research, and marketing and extension institutions are still unable to operate effectively as a system. Moreover, these institutions need major reform in philosophy and approach because the needs of smallholders and the conclusions are considerably different than for large-scale farming conditions.

Beyond Structural Adjustment

Development is a long-term process that unfolds over decades, generations, and centuries. Nevertheless, the North–South development dialogue has been dominated by a succession of short-term development thrusts that have originated in Washington, Rome, Brussels, and Paris. Over the last three decades, these development thrusts have included economic growth in the 1960s, integrated rural development in the 1970s, structural adjustment in the 1980s, and sustainable development in the 1990s. For example, about two-thirds of the nations in sub-Saharan Africa are currently implementing structural adjustment programs to improve macroeconomic policies, reduce the size of the government bureaucracy, and increase the role of the private sector and reliance on market forces. In most cases, structural adjustment loans have been cast in a short-term of 5–10 years.

The World Bank and many other donors have offered structural adjustment loans to African nations as an incentive to carry out badly needed policy reforms. But structural adjustment programs are not a substitute for a coherent and balanced long-range national development plan. Moreover, structural adjustment programs are not a substitute for a national agricultural development strategy. Finally, structural adjustment loans do not embody political muscle, which is vital to the success of the reforms because, ultimately, successful structural adjustment or policy reform is essentially a complex political bargaining process.

There is now a need for agricultural policymakers and planners in Southern Africa to move beyond structural adjustment and develop a strategy for an agricultural revolution. The challenge ahead for SADC is to put its political muscle, policy attention, and government expenditures behind a broad-based strategy to increase rural production and employment in both favourable and low rainfall areas, which is contingent upon strengthening the prime movers of agricultural development.

Smallholder-led agricultural growth will increase food and cash crop production and rural employment that, in turn, will generate effective demand for products from the industrial sector. But the agricultural technology/smallholder road to development is only applicable to rural households who have adequate land and resources (e.g., credit, draft animals, access to markets) to adopt new technology and employ all of the available family labour in farming. Rural households without adequate land or resources must be assisted by special food-for-work and food-safety nets and investments in health and education to equip them for eventual out-migration to the industrial–urban sectors.

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Understanding Food Stress at Local Levels

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Abstract *In this paper I reflect on the Food Systems Under Stress (FSUS) workshops organized in August–September 1993. In an attempt to identify the major obstacles to food security, the FSUS workshops brought together social and natural scientists, nutritionists, community workers, extensionists, and farmers who live and work in fragile environments. (Participatory methods were used, mostly to good effect, but space restrictions do not permit discussion of the methodology.) In the course of the workshops, stress factors were ranked according to their perceived magnitude, whereas suggestions for future research and problem solving were also considered. Here I highlight some of the ways in which stress factors are interlinked and how these linkages are perceived by people affected by food stress. The latter task is particularly important given the need for a policy response to the interconnectedness of food production, distribution and consumption (McMillan 1991). Because the in-depth analysis of the data collected in the workshops has only just begun (reports by the various teams are still in progress), my presentation on behalf of the FSUS group must be regarded as no more than a first reflection on the overall exercise.*

The complexities of Africa's stressed food systems, as experienced by communities, households, and individuals, have received much attention in recent anthropological research. Common features and structural causes of food stress have been outlined and reviewed, mostly with an emphasis on their dynamic interplay (Huss-Ashmore and Katz 1989, 1990; Campbell 1990; Shipton 1990). At the inaugural seminar of the Food Systems Under Stress (FSUS) collaborative research project,[1] participants took the debate a step further by concluding that the dimensions of Africa's food systems are not only dynamically interlinked but also evolving fast (Pottier 1993a). This may be seen in the speed with which familiar community-based mechanisms can break down in the face of new stress factors. Drought-coping mechanisms, for example, have an internal dynamic, linked to the forces of change within key social institutions (including marriage and clan membership); hence their own survival as strategies, their efficacy in a future crisis, cannot be taken for granted (El Samani 1990; Pottier and Fairhead 1991; Pottier 1993b).

Allowing for regional and location-specific diversity, the bundle of stress factors affecting food security in Africa today includes:

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[1]The FSUS program, initiated by the School of Oriental and African Studies (University of London) and funded by the International Development Research Centre (IDRC) and the Ford Foundation, aims to stimulate research on stress factors and conditions in Africa's food systems and hopes to help promote and strengthen a partnership involving social scientists, natural scientists, community workers, and policymakers committed to the realization of integrated approaches to food security planning. Countries taking part in the inaugural phase include Botswana, Tanzania, Uganda, Zambia, and Zimbabwe. Mozambique, Namibia, and Rwanda are expected to join in 1994.

- The escalating cost of modern food production on small farms (often in the wake of structural adjustment measures);
- The expansion of the range of informal survival strategies pursued by women, mostly time-consuming and rarely lucrative (again as a gendered consequence of structural adjustment);
- Gender bias in agricultural extension programs;
- Job losses in formal employment (and the subsequent reduction in incomes, both urban and rural);
- Reductions in the labour supply available for food farming (e.g., because of the diversion of male labour to cash crops, or labour losses because of Acquired Immune Deficiency Syndrome (AIDS) or people being killed in wars);
- A reduction in farmers' access to diverse microenvironments;
- Insecure land tenure;
- Reduced control over local food markets (often linked to inflation and economic insecurity);
- The emergence of ambiguities regarding food provisioning and entitlements (sometimes linked to the ambiguous status of new crops); and, finally,
- The absence of adequate methods and facilities for food processing and storage.

FSUS Workshops — August/September 1993

The village-level workshops took place in diverse settings. A summary of some of the findings follows. The Uganda workshop was held in Wera-Angole, Soroti District, an area marked by two dramatic recent events: the end of the insurgency (in 1991) and the virtual collapse of the area's agricultural base. Reasons for the collapse include the extensive cattle raids by Karimojong, the demise of the cotton market, and the outbreak of cassava mosaic. The entire food system in Wera-Angole is now being reconsidered by the people who live there. The second workshop took place at Magindu, in the semi-arid part of Tanzania's coastal region. Magindu suffered greatly during the 1990–91 drought (hence its selection), but it is also representative of many other Tanzanian villages in that it must face up to the consequences of two decades of villagization.

In Magindu, villagization was a process that forced Maasai herders and Kwere cultivators to live in close proximity and compete for scarce resources, water in particular. Water is not a

major concern in Kapatu, where the Zambian workshop was held. Nevertheless, Kapatu (in Northern Province) shares features with Magindu, especially the problem of degraded soils resulting from the implementation of Zambia's Village Regroupment policy in 1974, an intervention not unlike villagization in Tanzania.

In both cases, the concentration of people in amalgamated villages has left its mark on the physical landscape, soils are exhausted and yields are down. With Wera-Angole, Kapatu shares the problem that it is subjected to unfair terms of trade for its marketable produce (a problem also conspicuous in Zimbabwe). Kapatu's (and rural Zambia's) greatest headache, however, is how to deal with the slump of hybrid maize production on smallholder farms following the withdrawal of state subsidies. Already many villagers have started to vote with their feet, that is, they are preparing for a return to the pre-1974 village sites that they vacated in the name of progress.

Access to markets and soil degradation also topped the list of concerns aired at the Zimbabwe workshop, held in Ward Six of Buhera District. Situated in Zimbabwe's communal lands area, the villages in Ward Six are also struggling to overcome the combined impact of structural adjustment measures, the increased pressure on the land (because of internal migrations since independence in 1980), and drought. Moreover, the Zimbabwe workshop underscored the importance of seasonal food shortages (also emphasized in Zambia); a dimension to which I had paid little attention in my earlier review of stress factors (Pottier 1993a). The workshop in Tsabong, in Botswana's Kgalagadi District, again touched on resource use and trade practices. This last workshop, however, did not take place in a village but in an education centre, and was more of an encounter between farmers and local-level extensionists in which both parties outlined their respective and, at times, conflicting views on problems and solutions. Better than any other, this workshop showed how local-level bureaucratic institutions (and the assumptions on which they operate) must be treated as part of the problem and part of the solution to Africa's stressed food systems. This paper deals mainly with three workshops: Tanzania, Uganda, and Zimbabwe.

Stress Factors: Three Domains

Factors were commonly grouped in three domains: market integration; the natural resource base; the institutional domain (support services). The three domains are firmly interlocked as will be evident in the ways in which villagers reflect on market-related constraints.

Markets

Ward Six, Zimbabwe Ward Six is situated in the western part of Buhera District in Manicaland province. Buhera West is more densely populated than other parts of the District. It has an average rainfall distribution of 650–800 mm/year. Villages in Buhera used to be nucleated but homesteads nowadays are scattered. Many "foreigners" (some coming from South Africa) settled in the area around 1915, when the Dutch Reformed Church established its Mission at Makumbe. Ward Six has 27 villages, each one totalling some 100–150 people.

An important feature of the Ward is migration. In-migration since independence has already been mentioned, but there is also out-migration to the towns and industrial centres. Today, the

rate of out-migration is slowing down, because structural adjustment measures have resulted in widespread job losses. Many urban migrants returned to Ward Six in the late 1980s. Nevertheless, most young people are said to be in town — their labour lost to the village farms.

Nearly all households keep domestic animals (chickens, goats, and cattle), but numbers, of cattle in particular, have diminished over the years. Losses were especially high during the liberation war when freedom fighters demanded a constant supply of meat. In the 1990–91 drought, the Ward lost a further 25% of its cattle. Today, a well-to-do village household may have around 15 head.

Many households grow maize, groundnuts, bulrush millet (*rapoko*), fingermillet (*munga*), and millet (*mapfunde*). Vegetables are grown during the rainy season, but most gardens are abandoned in the dry season when the water supply turns problematic. Maize and groundnuts are increasingly grown for cash, while the production of traditional crops, especially *rapoko*, is declining. Despite their nutritional significance, groundnuts are today valued more as a cash crop than a food crop, because money is desperately needed to send children to school and settle medical bills and taxes, or to buy goods, such as blankets, which are bought before the cold season begins. This desperate need for cash, in Ward Six and other communal areas, can be linked to the decline of migrant remittances. In the early 1980s, in contrast with today, urban workers kept rural farms going by providing cash, seeds, and other inputs needed for maize cropping (Callear 1985).

As in other countries (Uganda, Zambia), today's cash-starved villagers sell more than they should, and do so at the worst possible prices. It is significant, for instance, that maize is sold in bulk almost immediately after the harvest in July, if possible to the Grain Marketing Board (GMB), although later, during the hunger months, it is bought back from private traders (or local farmers) who sell in small quantities but at high prices. This practice of bulk sales at harvest time (which is just before school starts) means that food stocks are depleted by the end of July/August. Poorer households in the area are, therefore, practically without staple food for some 6 months of the year. This may be hard to believe (and a slight exaggeration), yet in Chipadza village, where the workshop was held, 50% (8 out of 16) of the households do not have granaries.

Food stocks are also down generally as a result of the 1990–91 drought, when roughly a quarter of all cattle were lost. These losses have led to a decrease in the size of the plots on which maize is grown. Land is now being continually tilled and the practice of land rotations has collapsed. Crop production, however, is said to have declined especially from about the mid-1980s, with 1985 reportedly the last good year for farming. For one better-off household in Chipadza village, the 1985 maize harvest had amounted to 56 bags, compared with 15 in 1993. This year's millet harvest (*munga*) was six bags, also much lower than in 1985. Other households in Chipadza have incurred similar losses.

When food supplies run very low (especially between September and January), small quantities of grain and vegetables must be bought. The money used will come from the sale of small livestock or (in the case of a man contributing) from seasonal activities such as thatching roofs or causal labour, e.g., plowing in November–December.

That people sell crops in bulk at cheap, postharvest prices and buy back later at higher prices, is nothing new, what is striking, however, is that so much food is sold at giveaway prices

to private traders who operate locally and seriously undercut the official prices. When selling at Makumbe Mission, women from Chipadza will be paid 10 $Zim (Zimbabwe dollars) for their tomatoes, whereas they can double the amount when selling in Buhera (22 km away). Likewise, men selling maize to private traders in Gombe (4 km away) will earn 30 $Zim from a 50-kg bag, whereas they could make 45 $Zim if their produce could be sold at the GMB. Other discrepancies are even wider. The Gombe price of *rapoko* is 26 $Zim (50 kg), compared with 47 $Zim at the GMB and sunflower fetches 62 $Zim (90 kg) at Gombe, but 132 $Zim at the GMB. There are, however, strong reasons for not selling to the GMB. Even when the problem of finding transport can be overcome, this transport will remain expensive and farmers will need to buy empty sacks before dispatching their produce. There is also the problem of grading and that of delayed payment, as the following testimony shows. For all these reasons, farmers have no option but to sell to the poorly paying private traders.

When women expressed their views on why they must sell maize to private buyers, one woman put it like this:

> It is because of transport. At the GMB you need to buy empty sacks first and each bag is 3.60 dollars. You buy these and you pack them. And then you are charged 7 dollars for transport. All together you lose 10 dollars without seeing even one cent. But I forget, you still need to buy some thread and this needs money too... You cannot even use local transport. If you hire a donkey they will charge you three dollars (for each bag) to carry the maize to the collecting point. And also, if you sell to the GMB you will wait and wait and wait for your payment. And you have no way of enquiring. Another problem with the GMB is that if you are unlucky you might be given a lower grade for your good maize. And you wonder why they did it. They just allocate the grade they want. There are so many funny things going on at the GMB. You can send your bags in the morning and see them returned in the afternoon, because they say your maize is not yet dry (i.e., too heavy). But if you go again with that same maize in the afternoon, they will be happy, saying: 'this is the maize that we want.'

With the sale of vegetables, the main problem in trying to reach better markets is that the quantities an individual has for sale are insufficient to pay for the cost of transport to a good market, such as Buhera. Producer–sellers, therefore, do business at the Makumbe Mission, where prices are better than in the village, but here they are up against other problems. The missionaries limit the number of times a farmer can sell, and they often insist on bartering. There is also the problem of overproduction caused by the narrow range of vegetables grown.

Whenever workshop participants reflected on the consequences of the low prices they receive for the food they market, the discussion would turn to the question of school fees. Also, at other workshops, school (and medical) fees were perceived as a major immediate cause of hardship and food insecurity. Overcome by emotion, one man gave the following testimony:

> I have 5 head of cattle and I have a child attending boarding school at Makumbe Mission. He wants school fees for 500 dollars (for one term). I sell my ox at the local cattle sales point and the Cold Storage people say to me that my ox is not good. So I look for another market and go to Makumbe High School, where I sell it for 700 dollars. But the money that is needed is 1,500 per year. During the rainy season I lose one of my oxen through disease and so I have only three left, which will not be sufficient for draft power. We then end up using hoes for cultivation and get poor yields. Isn't that true, men?

Where poor farmers struggle to gain access to good markets, private traders may decide to meet them at home. In doing so, the trader may then operate in a situation devoid of competition, so he (rarely she) can impose even lower prices. Both the Uganda and the Zambia workshops highlighted this problem.

Kapatu, Zambia Before 1970, the food system in Kapatu centred on fingermillet production in large-circle *citemene* fields. The work was labour-intensive, but the diet, based on game meat and fingermillet, sufficiently rich and abundant for people to be food secure. There was also extensive vegetable production based on a network of furrows. Whatever the villagers did not produce themselves could be obtained through barter or with remittances sent by relatives working on the Copperbelt. Kapatu had a flourishing retail store.

The farming approach changed in 1974, when bloc farming for maize was introduced and villages became regrouped under the Village Regroupment scheme. The broad aim of this national scheme was to integrate agricultural production (maize) with service provision. *Citemene* agriculture did continue, but was disapproved of by officials and, in some places, banned. The new vision of rural development raised expectations about a happy "return to the land" and resulted in some in-migration into Kapatu, e.g., by Luapula people. These migrants obtained land via the UNIP Ward Chairman, as land allocations for bloc farming were not regulated by customary law.

Today, there is still some in-migration from the Copperbelt, e.g., by pensioners and people who have been made redundant, but the 1974 population move toward larger village centres is being reversed. Now, many people are moving back to their original sites, where the land has regenerated over the past 20 years. This return has been prompted by nutrient depletion in *citemene* fields near the homesteads and the withdrawal of all subsidies for maize farming. The grossly inflated price of maize seeds, fertilizers, and pesticides is driving people back into the bush. For those who continue with maize cropping, there are serious problems too with the timely delivery of inputs and payments to farmers. (This problem, identical to the situation in Zimbabwe, was brilliantly acted out during a play performed at the start of the workshop.) Moreover, goods can no longer be purchased in the village shop or in the weekly market, as both have ceased to operate.

Up to now, the broad cropping pattern (which is disappearing) is to intercrop maize and beans in sandy plots near the village centre, whereas fingermillet, cassava, groundnuts, and beans are grown away from the centre in *citemene* fields. Some fingermillet is still grown in fields near the homesteads, but the size of the fields has become very small because of the declining availability of wood. Farmers who are not planning to move their homes away from the regrouped village site have started to build temporary houses (*mitanda*) in places where there is more forest left and where they can cut new *citemene* gardens.

The Zambia workshop differed from the Uganda and Zimbabwe workshops in that it brought out a new dimension, internal social differentiation. In Kapatu, women emphasized that part of the problem of marketing is the social differentiation that exists *within* the rural area. Urban–rural terms of trade may be unfair to the producer, yet a similar exploitation exists within the village area. To understand fully the perspective Kapatu women put forward, we need to look at recent migration trends and how these have shaped the social composition of villages. In Kapatu,

households are perceived to belong to either of three categories: *abalya bwino* (those who eat well), *Ee filyako* (those who manage all right), and *nakalya* (those who have insufficient food).

The first category is made up of men who receive a pension (i.e., retired migrants/miners and their households), the second category is made up of men/households who receive a small pension or remittances from town (e.g., from their grown-up children), whereas poor people are described as "those who do not even have pumpkin leaves." When it is time for planting, the latter will be working-for-food in the fields of the *bwino* group, while delaying work in their own fields, which produce very little. Poor households experience periodic shortages of cassava, their main staple, especially during the rainy season.

Such deficits, and the labour arrangements that contribute to their occurrence, are central to an understanding of how the market operates. In addition to selling their labour, poor farmers also sell produce to the *bwino* farmers or (more often) barter on very unequal terms. For example, when poor women harvest caterpillars in November–December, the period when their households lack cassava, they are likely to approach the *bwino* farmers and exchange the caterpillars for cassava (or maybe maize). The trade in caterpillars (*fishimu*) is potentially very lucrative, but the real profits are reaped by the *bwino* farmers. During the same period, poor women may produce small amounts of beans (although this is the first and not preferred bean season) and sell to *bwino* and *Ee filyako* farmers, either at a cheap price or on unfavourable barter terms. Alternatively, they sell (again on poor terms) to private traders who tour the villages and swap secondhand clothes for beans. Bean barter was already practiced in the late 1970s (Pottier 1988). The loss of Kapatu's local store and weekly market have made the area more vulnerable overall, but it is the resource-poor farmers who are hit hardest.

That poor village women end up selling to their better-off neighbours (to whom they may well be financially indebted) is a situation that has worsened since the collapse of Kapatu's weekly market. This market used to be organized by the Roman Catholic Mission. Burdened with all kinds of chores and commitments, poor women cannot organize themselves to visit the more distant markets. The nearest market for food now is a daily one, some 8 km away, which is too far to be frequented.

Wera-Angole, Soroti, Uganda Marketing is also a primary concern in Soroti, Uganda, where "the problem of markets" was ranked by the workshop participants as their big problem no. 2. This workshop highlighted yet another aspect of marketing, how to access good markets when the village economic base has crumbled and familiar markets (seasonal markets for labour or produce, the cotton market) are slipping away.

The marketing problem in Wera-Angole is closely entwined with the recent collapse of the rural economic base (problem no. 1). This collapse was triggered by the loss of cattle through raids and (but, perhaps, to a smaller extent) the demise of the cotton market. Cattle and plows were looted during the years of rebel activity, when raids by Karimojong intensified. Having lost all their cattle, the people in Wera-Angole can no longer cultivate as extensively as they used to do. They are anxious, however, to rebuild their herds, because oxen are needed if the familiar agricultural system, based on ox-plowing, is to be restored. The potential for agriculture remains very good, rice, sorghum, millet, groundnuts, and sugar can all be produced in abundance. Sunflower and simsim are also grown. Currently, however, like in Zimbabwe, the loss of cattle (in this case, total

loss) has resulted in a very serious reduction in the size of gardens and, therefore, a reduction in the food supply.

During a protocol visit before the workshop, the District Executive Secretary (DES) referred to "the problem that Soroti has lost its market outlets." Outlets have been lost, he explained, because of increased food sufficiency in neighbouring districts. For instance, Lira now produces sorghum, and even Karamoja has sufficient millet and sorghum, potatoes, and beans not to have to buy from Soroti. Farmers now have lost the incentive to produce for the market.[2]

The negative impact that the overall market situation is having on people's morale in rural areas like Wera-Angole (i.e., on their desire to produce for the market) was confirmed by a participant who complained about the lack of a good market for potatoes. (Potato production has recently increased because of the spread of cassava mosaic.) This woman said:

> ...there is no market, so we use (potatoes) for distilling crude *waragi*. Potatoes cannot stay in the ground for long; even when we slice and dry them and keep them in the granaries, they just rot. Sliced and stored, potatoes only last for three months. The lack of a market for our crops prevents us from growing more the following season.

What the workshop added to the view expressed by the DES is that Wera-Angole has the further disadvantage that its own production levels are declining, primarily because of the loss of cattle and the implications for labour power. This is an important aspect of Wera-Angole's current inability to make money through market participation. Having given up on cotton cropping (once a major income earner), because of corruption and slow bureaucracy, money now has to be sought in expanded food production. It is here that farmers are unable to produce sufficiently.

Essentially, all the major staple foods show signs of a serious drop in production. Thus, although remaining a key crop, millet is down for three reasons: the loss of cattle, which makes land preparation very difficult; the disappearance of the cotton crop, which used to be grown in rotation with millet; and the infestation of stiga weed (*amoto*), which germinates in gardens where millet and sorghum are grown without fallowing. Stiga stunts the millet. People also comment that they have become too weak to take on the new burdens. Their weakness in part results from the insurgency (1985/86–1991), when they were frequently beaten and when there was also an increase in malaria.

The production of rice, for which bumper harvests were recorded in the 1960s, has also drastically decreased. Again, the main reason for the decline is that opening the swamps is difficult without the use of a plow or tractor. In addition, and equally important, the cassava crop is affected with mosaic, and cowpeas are declining as the crop is attacked by firefly (*amuye*). The latter decline is important in terms of food stress, because cowpeas (*imare*) provide leaves that can be eaten as a vegetable. (Cowpea leaves are picked before the flowering stage, dried and consumed

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[2]The analysis can go further. To the food sufficiency in nearby districts must be added the decline in the demand for food within Soroti town itself, where salaried workers are cutting down on meals (from the customary three down to two), because their relative earnings have dropped following government austerity cuts (observation by Charles Ocan, Centre for Basic Research, Uganda). Moreover, the salaried workers increasingly grow their own crops to cope with the reduced buying power of their salaries.

during periods of hunger.) The drop in cowpeas undermines food security in Wera-Angole. Last year, farmers grew a new variety of cowpea seed, but the plants just grew vigorously and never produced flowers.

Although there is expanded cultivation of tomatoes, cabbage and onion, soybeans, beans, and sunflower, all the major crops (and cotton) are in decline. Bambara nuts (*kali*) are also declining (there is no market, and they are little eaten locally), whereas banana production is stagnant. Sugarcane, too, is said to be in decline because farmers have learned that it exhausts the soil rather quickly. Also, wild fires are notorious in the area and often destroy whole plantations. The overall decline in food crops has a very depressing effect on farmers' ability to make cash.

The cash flow situation in Wera-Angole is further aggravated because other familiar sources of income are also under threat, e.g., the nuts from the shea tree, a species seemingly on the verge of extinction. Shea (*Vitellaria paradoxa*), called *ekunguru*, grows on upland soils and its nuts provide excellent cooking oil. The nuts are used for sheabutter, and youths like to pick them and have money toward school fees. The tree's survival is threatened because it is good for charcoal making, and because soldiers stationed in the area use its bark to smoke out mosquitoes in their camp at night. Also, there is now restricted access to shea nuts. As with the rice land (once communally used for grazing, but now increasingly considered to be private property), access to shea nuts is no longer on a free-for-all basis. "Those who grow millet or sorghum near such trees now have first rights to their fruits and seeds!"

Sheanut oil is obviously a good source of income. Half a litre is worth 300 shillings at Wera, but fetches 500 shillings in Soroti. The price differential, however, exposes yet again the problem that poor/isolated people are finding it difficult to reap the full benefits of their labour. The deteriorating market situation, which is making life really difficult, was often commented upon.

> People in our area sell groundnuts and peas, but the market for them is not very good. Traders rather go to Kumu district, which is nearer Kampala. When private traders visit our area, their presence (i.e., disinterest in food crops) has a depressing effect on prices. Generally, the price of food in our local weekly market is very low. For instance, the price of a bowl (5 kg) of groundnuts has dropped from 2,500 to 1,500 sh.

This is apparently not just a seasonal (postharvest) drop but results from the fact that the villagers do not pull together to arrive at an agreed minimum price below which they refuse to sell; a problem also identified in Zambia. When traders do buy foodstuffs, they do so "privately" at the lowest possible prices.

A market for fish now seems to exist however, but the people complain about their primitive fishing techniques and the risks they run. Although women carry many extra responsibilities, workshop participants agreed that:

> The most important activity in this area done by women is fishing. The assistance we would like from you is with fishnets. We use rudimentary methods. Women used to grow a lot of rice with their husbands, when we also had cattle, but now women cannot dig to plant the rice. We have become very thin, so how can you dig?

At the end of the workshop, the problem of the market was summarized like this. A lot of land in the area is still fairly fertile and most crops can be sold (groundnuts, cowpeas, simsim, millet) but, right now, food production is drastically reduced and the people of Wera-Angole sell at giveaway prices. A participant said:

> In the market there is only one buyer, who brings the price down because we all turn up with the same type of crop! We now need to organize ourselves so that the price cannot be lowered. But people are prepared to go down. When you sell at the buyer's price, you cannot buy any of the manufactured goods. That's the whole problem with the market here.

Equally important, the search for alternative market outlets is led by women. This has caused a major social revolution in household relations. Broadly speaking, before the cattle raids, all cash needs were met by men, but now, with the breakdown of the (cattle-based) economy, things have changed. It is women now who shoulder many of the responsibilities (e.g., school and medical fees). For this they brew *ajon* or crude *waragi* (made of potatoes). A man said "Women now lead as income providers. Men cannot brew (*ajon, waragi, marua*), because these activities relate to the kitchen. It is now the men who come to the women and ask for money." A catholic priest repeated the point, stressing that men were not having an easy time "Men are now left with their hands tied. The pride of a man as head of the household has collapsed, men are now women in the home and women have now become men. The man who beats his wife today is a fool."

Interestingly, in the public space of our participatory workshop (private views may differ), women pointed out that husbands could not be blamed for their reduced contribution to the food supply. A woman said:

> The problem is the collapse of our household economy (*akerianut*). We used to have cattle and goats, and husbands would sell a cow which was enough to cover expenses. We, ladies, did not have to worry about this. The cattle raids broke down our rural economy and our men have nothing to sell. So we women fall back upon all these activities that evolve around the kitchen, like making pancakes in the market or selling fried cassava fritters or brewing *ajon*.

A man added "What has made women leaders in income is also that men now spend too much money on *ajon*. Before the raids we had money and we also worked more land together. And there used to be plenty of beer during ceremonies. So we spent little money on beer, we did not have to." Spending money on *ajon* can sour household relations as it syphons off hard-earned cash that could be spent on feeding the household.

The tension that such spending may cause sometimes comes into the open, as when men appropriate money their wives have earned from their own hard work. Thus in Ward Six, men claim part of the proceeds of the tomato sales during the 3 months that tomatoes are abundant. At the workshop, women reminded men, with a good dose of animation, that it was they who cultivate tomatoes, because they (and not the men) do all the washing. Water used for washing is then poured onto the vegetable gardens. The argument we witnessed suggested that the women's right to sell the tomato crop is being contested by men at times of peak availability, and how this leads to tension and conflict within households.

But women can be firm with their incomes. In Kapatu, Zambia, groundnuts are a crop controlled entirely by women: "husbands don't even know when it finishes." Regarding *fishimu* (caterpillar) money, there was also some consensus that women are generally very strict. The Zambia workshop provided further indication of changes at the household level. Women used to grow maize together with husbands (and often quarrelled about how to divide the proceeds). This is changing now, as some women are opting out to grow their own maize crops, for which they may even receive loans in their own names. Increasingly, women manage fields in their own rights.

In Wera-Angole, too, gender-based allocations in food production are definitely changing. Women pointed out, for instance, that a few men are now also getting involved in firewood collection (for use in the home); even though water collection and weeding remain exclusive women's activities.

In this preliminary analysis of the data on markets, I have drawn attention to three levels/arenas where bargaining occurs — between urban and rural areas, between rural poor and rural rich, and between rural men and women. This means that a woman responsible for food security in a poor household may be involved in three struggles (on three different levels) where the odds are against her. To achieve food security this woman will need to increase her own bargaining power vis-à-vis men, the bargaining power of her social group within the community, and her community's bargaining power vis-à-vis the urban traders. The elements needed for such a "vertical" analysis were all articulated at times at various workshops, whereas the overall analysis here provides the aggregated picture. Action research planned for the near future will assist local people with expanding their own analyses.

Natural Resource Degradation

One finding to come out of all workshops is that natural resources are being depleted, with detrimental effects on food production levels and ways of achieving food security. There is evidence of depleted soils (Tanzania, Zambia, and Zimbabwe), loss of draft animal power (Botswana, Uganda, and Zimbabwe), loss of tree cover or water availability or both (Botswana, Zambia, Zimbabwe). There is evidence, too, of restricted access to resources and mounting tensions regarding existing arrangements. In every workshop setting, villagers are also having to rethink the ways in which they allocate other resources, e.g., labour power and labour time. In short, entire livelihood systems are being transformed, with consequences for food security and social relations.

In Wera-Angole, the skewed distribution of fertile land (mainly swampland) was commented upon by women. Women said: "The problem here is not land availability but the distribution of fertility. Some households have fertile lands while others only have poor soils." The importance of swampland is linked to the fact that gardens there retain moisture throughout the year and that millet and rice still do well. Rice can be double cropped, and millet sown in December is said to be excellent. Exactly how important is the skewed distribution of fertile land in terms of food security is not clear at present, but it was striking that workshop participants frequently referred to a 1956 by-law when no one was allowed to cultivate within a distance of 400 steps from the edge of the swamp; a stretch reserved for cattle grazing. In theory, the law is still in force (people said) but, now that the cattle have gone, some villagers have started to encroach on the communal land, and a system of individual land tenure is emerging. Other aspects of natural resource

management are also causing concern. Space restrictions do not permit a full discussion, but the management of water and trees is singled out for special mention.

Tree Management A concern not dissimilar to the loss of cattle/oxen is the disappearance of valuable trees. In Wera-Angole, the shea tree may be a thirsty variety and not good to intercrop with, yet its preservation is essential if another valuable source of food and income (cooking oil made from the nuts) is not to be lost. Shea still grows in the upland areas, yet some locals estimate that the tree could be extinct within 5 years. Moreover, as already seen, access to shea fruits/nuts is being curtailed and ownership rights are now recognized on a "whoever-owns-the-land" basis. This social dimension of natural resource management must be underlined.

Villagers in Magindu are equally concerned about the disappearance of hardwoods from their village. Sadly, at the time of the workshop, we learned that the last few remaining ebony trees had just been logged. The District Agricultural Officer (DAO) explained that the Forestry Department does not need to consult villagers before licencing the logging of ebony, but he pointed out that the logging company must pay its dues to the village. No one on the transect walk that led to the discovery of the logging, however, could tell how much the village would get from the sale.

A further issue is the sustainability of swidden agriculture. Whether swiddening can be reconciled with sustainable forest management may be a contentious issue (especially because population density must be taken into account), but the need to work toward sustainable swidden systems is a pressing and very formidable challenge for the people of Kapatu, Zambia, where many villagers are now returning to the very areas they vacated in 1974. Throughout Zambia's northern region (and possibly elsewhere), swidden agriculture is being practiced again (and on a vast scale) even though the mature trees needed for a good burn have, by and large, disappeared.

Water Management Internal migration and resettlement by people desperate for land, possibly a frequent occurrence these days, regularly results in the depletion of woodland and, in turn, may lead to water sources drying up. The drying up of springs and streams is a particular concern in the village of Chipadza, Ward Six, where an adjacent valley became inhabited in the 1980s. The removal of the forest cover in the valley has caused water levels to drop. The lower levels are watched with some alarm, as this change in the ecosystem is impairing the capacity for vegetable production during the dry season.

Women in Ward Six also emphasized the distances they need to walk to the water points, saying that there was either little water in the wells or none whatsoever. Water, women said, was the major problem in the village. Besides actual availability, women are concerned about diseases that may result from sharing water points with animals. Women's interest in a better water supply has much to do with their interest in cultivating vegetables for local consumption and for sale. At the moment, they can only grow vegetables in the rainy season, after which it is difficult for them to do anything. Women want to see a situation where they can access water easily.

Concerns over water relate not just to water levels and how these can be maintained or improved, but include the protection of existing water points. Thus in Magindu, Tanzania, where a water reservoir built in 1957 provides water both for domestic use and for animal use (via seepage into wells), Kwere agriculturalists and Maasai cattle keepers are embroiled in a fierce

argument over the reservoir's deteriorating condition. Central to this debate are the cattle tracks that run very close to the walls of the dam. Kwere cultivators, therefore, argue that when cattle trample the earth, they seriously endanger the walls. (In the same way, Kwere blame soil deterioration in their fields on cattle browsing.) The issue is rather complex, because accusations against Maasai are couched in words that contest their right to the (seeped) water itself.

In Wera-Angole, boreholes are also poorly protected and the water is far from pure. The prevalence of disease, combined with the increasing demands on physical labour, is a serious stress factor. Boreholes are few and far between and, because the water is at times very unclean, women and children spend excessively long hours fetching water. Women fetch water up to three times a day, and may spend 2 hours collecting firewood. These extra chores must be added to the extra demands on women's labour in the field; for example, "turning over the soil after it is sown with millet used to be done by animals. Now women cover the seeds pulling tree branches behind them."

At the same workshop, concern was also voiced regarding fishing practices and the possible danger of fish stock depletion. Although most of the discussion, an extensive one, addressed the need for technical assistance (the need for better and safer methods), young people worried about overfishing. "We catch too many tiny fish," they said.

Problems to do with natural resource management may also result from the new conditions under which people live and farm. These new conditions require new types of knowledge. For example, how should farmers deal with the infestation of the notorious stiga weed (*amoto*), which affects gardens where sorghum or millet are cultivated without fallowing? Put more generally, the main problem is how to make new knowledge available quickly. As another example, without the use of traction animals, many women in Wera-Angole feel they need new knowledge as "some of us are still unfamiliar with food cropping, so we may plant at the wrong time or do bad weeding...." (These struggles with "new ways" were echoed in a discussion about maize.) It is worth noting here that the problem is not knowledge loss, but rather with the pressing need for information relevant to new circumstances.

This is not to say that knowledge/biodiversity losses have not occurred. In Ward Six, for example, we learned that local maize has now almost totally disappeared, allegedly because the soils are too exhausted. Interestingly, there used to be no storage problems with local maize. It was stored in the mango tree until the tree sprouted, after which it would be shelled. The elders also recalled how they would predict a good rainy season when there was an abundance of the *chakata* fruit. Young people, they added, do not know how to read nature. Similarly, in Zambia, following two decades of modern maize farming, young farmers may not possess all the know-how required for achieving optimum efficiency when attempting to manage millet- or sorghum-based intercropped fields.

In the fast changing, fragile environments of rural Africa, there can be much uncertainty about what is, and what is not, good management practice. It is here that support and guidance (including "participatory research") by extension workers is particularly required and, as it happens, quite often lacking.

Institutional Constraints

At the workshop in Zimbabwe, after a poor farmer had described how he receives low prices for the mangoes and guavas he trades in his own neighbourhood, an extension worker suggested that the poor were either ignorant or lazy. He said: "I want to ask the presenter whether he wants to remain as a local [village] seller. What is he afraid of? Why does he not go and sell at the township like others do?" People reacted angrily: "how can you say this, how can we go to Makumbe? We do not have transport." Their message was clear, using transport when selling small quantities does not make economic sense.

Because extension workers were present at every workshop, the workshops became good opportunities for an initial monitoring of farmer–extension worker relations. Two observations should be made. First, that forums for open dialogue about agricultural practices are lacking in Africa. Second, and closely linked, that extension workers will need to reconsider their conceptualization of the "farmer" (see also Fairhead 1993).

These two challenges, workshops revealed, must be tackled within very specific politico-cultural settings. In this respect, an extension worker in Zambia pointed out that when hybrid maize was introduced, the concept of the farmer became redefined so that "farmer" today means someone who grows hybrid maize. Being a "good maize farmer" is almost synonymous with being a "good citizen" (Gatter 1993). Consequently, when extension workers are interested in working with the poor, the latter may well say "no, it is not us, we do not farm." To enable extension workers to perform better, research will need to investigate not only the "farmer" images held by extension workers, but also those that poor farmers have of themselves. Related to this, the workshops confirmed that most extension workers still regard themselves as teachers rather than learners (see Hedlund 1984; Pottier 1989).

Stresses Related to Institutional Inefficiency The Kapatu workshop opened with a magnificent, satirical play by villagers. The play consisted of a series of visits by one extension worker to two poor households. During each visit the extension worker offered some "good advice," starting with how to make the most of modern maize farming by obtaining a loan. Each time, the advice led to crop failure, because inputs either arrived late (in the case of maize) or had not been mentioned (e.g., lime and pesticides on "traditional crops"). As the farmers began to despair over the continued failures and the rising interest of their initial loan, the extension worker admitted that the only strategy that might still save them was to return to *citemene* cultivation, the practice condemned by government.

Farmers' hunger for sound institutional support is not restricted to agricultural extension work. Thus, several times in the workshops, other "departments" came under attack, especially during Venn diagramming.[3] Here is some evidence from Wera-Angole, where the Forestry Department came under fire:

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[3]Venn diagrams (also called circle diagrams or chapati diagrams) explore the relative importance of and interrelations between development institutions (Chambers 1992).

> Although the staff are around, we receive no help with planting trees. Moreover, a lot of charcoal burning is taking place, for which the shea tree is used. The charcoal burners are destroying a tree that is very valuable to us as it provides us with income. The Forestry Department is doing nothing to stop the destruction...

Fisheries, health, education, and water, also came in for serious criticism. Fisheries staff allegedly show no interest in improving fishing technology, even though fishing provides much needed income. The health service was criticized because of its "cost sharing" policy (300 shillings per consultation), the education department was blamed for not paying its teachers on time. The water department, although praised for having repaired certain boreholes in the area, was again criticized for not having added any.

Extension Advice and the Teaching Approach Although some departments and their staff came in for heavy criticism in Soroti, others were praised because of their readiness to "learn with farmers." It is here that national policies and styles of leadership become important. The Soroti-based Assistant District Agricultural Officer (ADAO), for instance, had clearly come to the workshop to learn and to advise, rather than to "teach them." His presence was applauded, particularly during the transect walk, which turned into a clear exercise in mutual learning (something characteristic of Participatory Rural Appraisal). Earlier in the workshop, participants had been told by the ADAO about the stiga weed, later, during the transect walk, the connection between the spread of the weed and the recent changes in cultivation practice became apparent. Also, the walk led to a discussion about the new cassava variety introduced 2 years ago and said to be mosaic resistant. Farmers were glad to have a chance to discuss this new variety, which, they complained, was not 100% resistant in the second generation.

The Uganda experience contrasted with the way in which agricultural services are experienced in other places, e.g., in Ward Six, Zimbabwe, where restoring (instilling?) farmer trust in extension services (and vice versa) could take considerable time. In Ward Six, many farmers had recently suffered the consequences of the local extension worker's "teaching" approach. Those who had followed his advice by planting beans on a specific date (!) had seen their plants wilt; those who had waited for the rains had done much better. The lack of trust in local government services is widespread in Ward Six. A woman from Zenda remarked:

> In our village we formed a cooperative and bought a tractor which was later taken. We were promised hoes and plows, a grinding mill, and some harrows, and I was chosen to be chairman. When I went to the Ministry of Agriculture, they promised to write letters to donors on our behalf. We were told we were going to get tractors, but up to this day we have not received anything, we are still waiting.

Rebuilding trust in the agricultural extension service is a problem closely linked to that of marketing, especially when policy has promoted crops for which there is no ready-made market. In Kapatu, Zambia, the current campaign by the Adaptive Rural Planning Team (ARPT), through which the FSUS program is run, is based on fostering a "listen and learn" attitude in extensionists, so that past mistakes can be avoided. Now that the Kapatu workshop has brought to light how complex the marketing issue is, the lessons learned will need to be built into future policy. The workshop was a decisive step in ARPT's commitment to move toward process planning.

"Listen and learn" is an attitude that some extension workers (and academic researchers at that) still need to acquire. In both Tanzania and Botswana, local extension workers were finding it very difficult to consider, e.g., why farmers went against extension advice (Tanzania) or why they ignored schemes for the supplementary feeding of infants (Botswana).

Despite the criticisms they occasionally endured, many extension workers taking part in the workshops clearly enjoyed being learners. The danger, however, is that their new experience becomes a one-off treat. A Zambian workshop facilitator articulated the concern:

> unless we set up a mechanism that ensures that people at the top adopt a similar attitude of listening and learning, little will be achieved. Eventually, the job description of the extension worker will need to be changed.

Conclusion: Research and Capacity Building

The FSUS workshop encounters suggest that markets must be treated as a paramount concern. In many ways, to research on stressed food systems in rural Africa is to research on cash flows. When the Zimbabwe workshop ended, participants discussed what kind of future research there should be. One participant said:

> If researchers now want to come to help us in matters of food, they must know we want to get money easily, we want to send our children to school, we want to send our children to hospital. You see, we do not have ways of raising money, we want more knowledge on how to avoid such problems.... We want you to say: try this, try that.... We want money and can those in research find out why our children are not going to school.

Putting together the evidence obtained from the three workshops on which I have concentrated, an initial assessment of market constraints can be made. In each situation, better-off farmers have the means to buy up whatever small surpluses the poor produce and to cash in on some good profits in better markets. So the poor suffer a double blow. First, the urban–rural terms of trade overall do not favour the rural areas. Second, within the rural areas, poor farmers are disadvantaged by the internal dependency that has developed. Barter terms are often insisted on by the stronger party and further disadvantage the poor producer–seller. Unequal terms of trade, however, also apply within households when these terms are negotiated along gender lines. For the majority of poor women, the household thus becomes the third level where dependency is experienced and must be overcome.

Regarding the household level, future research on intrahousehold change and its dynamics will also need to look into the consequences of male impoverishment, highlighted in the Wera-Angole workshop (and possibly a spreading phenomenon), and consider ways in which women organize themselves, collectively and individually, to meet the new expectation that they are the providers of income. The extent to which gender roles and power relations are renegotiated throughout rural Africa is currently far from clear, but the consequences for food security at local levels will be most significant.

Research on food market dynamics, however, must pay attention to the extent to which natural resources are being degraded. The extent of such degradation can be vast, is mostly understudied, and has invariably a strong local political dimension that will need to be tackled through dialogue. Forums in which to explore resource degradation and settle rights of ownership and access are much needed.

Before development initiatives can build upon a sound understanding of how poor people perceive their own food insecurity (Maxwell 1992), it will be necessary also to learn more about how the very poor cope. The FSUS workshops generally displayed a high level of participation and dynamic interchange, often with a clear sense that a forum for genuine dialogue had been set up, but the coping mechanisms of the very poor remained insufficiently highlighted. One related obstacle is that workshops, no matter how participatory they may be, are still *public* activities — and that certain aspects of social life are best left unsaid in public. Certain coping strategies can be discussed openly (e.g., selling food below its marketable value, food for work, collecting wild foods, etc.), others are not easily mentioned in public (theft, food for sex/marriage, poor people cheating each other when trading, and so on). To understand how poor people really go about their coping strategies will require more intensive, longer term field research (see Dzingirai 1992).

Finally, there is much local interest in participatory research, especially regarding the workings of government departments, the threat to natural resources, the making of food policy and the prospect of involving small rural producers in policy. The overall workshop experience suggests that enthusiasm for participatory research is fully warranted, but that steps must now be taken to better involve the poorer segments of society and write "participatory research" formally into the repertoires of extension workers.

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Canadian Perspectives

Peasants' Perceptions of Their Food Security: Identification of Alternative Indicators, Burkina Faso

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Abstract *According to the definition accepted by the United Nations, a household is food secure when it has access to the food needed for a healthy life for all its members (adequate in terms of quality, quantity, safety, and cultural acceptability) and when it is not at undue risk of losing such access. The surveillance of household food security implies the consideration of each of these dimensions. At the same time, we should place food security within the more global context of household livelihood systems. A study carried out in Burkina Faso of household food security strategies, adaptation mechanisms in times of food insecurity, and the perception of household members on food security has allowed us to identify potential indicators of different food security dimensions. In the case of the community under study, these indicators reflect the types of access to resources based on the categories of production, trade (exchange) and claims, as well as certain aspects of food consumption or people's social behaviour. All these indicators vary according to people's feelings about and perceptions of food security.*

Although food security often becomes a concern in its own right, it is worth noting that this concept emerged primarily from the concern to alleviate hunger and malnutrition, especially after the 1974 World Food Conference. At that time, concern focused on national food security. In recent years, the concern has gradually shifted to the food security of households and their individual members. The goal of this concern, nevertheless, remains one of helping to alleviate malnutrition by achieving food security and thus contributing to improving the well-being of the population.

Although not all actions that claim to improve food security necessarily have a positive impact on nutrition, activities designed to enhance food security do not always suffice to combat malnutrition. Adequate care provided to mothers and children, together with adequate health care, are also required for households to benefit fully from food security (UNICEF 1990).

Against this backdrop of the link between food security and nutrition we will:

- Draw attention to the implications of the evolution of the concept of food security for food security surveillance programs;
- Present some of the results of a study in Burkina Faso to identify potential indicators for household food security.

At the outset, we draw attention to the now widely accepted definition of "household food security," the definition promoted by the Sub-Committee on Nutrition of the U.N. Administration Committee on Coordination (ACC/SCN):

> A household is food secure when it has access to the food needed for a healthy life for all its members (adequate in terms of quality, quantity, safety and culturally acceptable) and when it is not at undue risk of losing such access. (Anon. 1991)

This definition includes not only the widely accepted definition of the concepts of quantity and access, but also those of the quality, safety, and cultural acceptability of food, together with the notion of a risk, or threat, of the access being compromised. This definition of food security thus appears to be a fundamental prerequisite of adequate nutrition. In fact, some, if not all, members of food-insecure households risk seriously compromising their nutrition through an inadequate food supply.

Two Levels of Food Security

The concept of food security has evolved greatly since the 1970s. A distinction is now drawn between two main levels of food security: national food security and household food security. The shift of focus from the national to the household level has to date revealed the complexity of the mechanisms that provide household food security. This evolution of the concept of food security already seems to have significant implications for surveillance systems.

National Food Security

National food security involves an overall availability of food that is sufficient to meet the population's overall food needs. It depends largely on the combination of net national food production, imports, and food aid where applicable. National food security focuses primarily on the *quantity* of food available throughout the country and the population's total food needs.

Food may be available within the country yet remain inaccessible to a large number of households or to certain members within households. National food security is still a prerequisite for household and individual food security yet is no guarantee of it (Eide 1990; UNICEF 1990; Anon. 1991).

Household Food Security

What are the prerequisites for guaranteeing or generating household food security? What are the causes of a lack of household food security? The answers to these questions reveal new dimensions to the concept of food security.

In addition to the concept of availability in national food security, the conditions under which households have access to food also become relevant. What are households' conditions of access to food or to the resources required to obtain food? Sen's work (1981) on the access to resources had a profound impact on the development of the concept of household food security during the early 1980s.

The definition of food security referred to in the foregoing further enriches the concept of food security by adding to it the components related to quality, safety, and cultural acceptability of food. The definition further emphasizes the concept of risk or of threat to access.

Phillips and Taylor's work (1991) contributes an interesting perspective on risk by balancing it against insurances. These represent the tradable resources or assets that make it possible to offset risks, which in turn are more or less the shocks with which households must deal. Household food security also includes factors of resistance and sensitivity to the unexpected (Eide 1990; Bayliss-Smith 1991). A household's resistance to the next shock also depends on the frequency and intensity of previous food insecurity episodes (Maxwell 1990).

For a household to be food secure, the food distribution within it must also enable each of its members to meet their needs to lead a healthy, active life. The distribution of food to more dependent members of the household, such as small children, requires other members of the household, usually the mothers, to be available to ensure their access to food.

In brief, the concept of national food security may be easier to conceptualize (although not necessarily to achieve), because it focuses primarily on food availability. Household food security, nevertheless, cannot be seen simply in terms of aggregating down national food availability to the household level, as this process would not take into account the full, complex reality of mechanisms that ensure or endanger household food security. A discussion of food security at this level allows us to specify the concept of risk further by taking into account its impact on the durability of "livelihood systems," i.e., its effect on the resistance of livelihood systems in view of their vulnerability to shock.

Livelihood Systems

To maintain or regain food security, households adopt different strategies within their livelihood system. The livelihood system to which we refer represents the highly complex set of daily activities undertaken by a household to meet its overall needs, including its food needs and its social needs. Food security is but one among other priorities for ensuring the overall security or durability of the livelihood system itself. The security of the livelihood system in return promotes household food security.

Households facing situations where there is a high level of food stress or where their livelihood system is threatened, or both, will often prefer to sacrifice the immediate satisfaction of their food needs to preserve other elements essential to maintaining their livelihood system (Corbett 1988; de Waal 1989). They may, for example, decide to save their remaining stock of grain to use as seed rather than eat it, even where food supplies are insufficient. Placing food security into a livelihood system context provides a better understanding of the mechanisms that affect food security and increases the relevance of actions designed to attain it.

Food Security Surveillance

Objectives

There are many objectives and types of food and nutrition surveillance systems (Rothe and Habicht 1990). Where the desired objective is to determine the need for imports or food aid or to identify regions where food availability is at risk, a national type of surveillance system is appropriate. Such a system is based on indicators related to production, markets, and, to some extent, access using income data, and may be the tool preferred by governments or bilateral development assistance agencies. The indicators generally used in these systems are uniform across regions. They are not very sensitive to livelihood system diversity nor to the specific causes of local household food insecurity.

Approach

Davies (1993) discusses two approaches to developing a household food security surveillance system. The first of these is called "food first" and could also be called the "food systems approach." It endorses Maslow's needs satisfaction scale theory where people seek to satisfy their food needs before any others. Using this approach, surveillance focuses on food systems (and preventing their collapse) rather than on people who are food insecure and on their livelihood systems.

The primary goal is to make food available at an affordable price. According to Davies (1993), this is a minimalist approach. This approach does not dwell on the specific behaviour of households, nor does it take into account the conditions under which food is accessible. It neither provides a guarantee that households will opt to consume this food nor enables us to anticipate their decision. The resulting interventions may promote, but will not necessarily lead to, household food security as defined above. In the best of all possible worlds, one might imagine that this food reaches households; yet, in reality, will what the poorest household decide to do with it not depend on their priorities within the context of a threat to their livelihood system?

The "livelihood systems" approach to surveillance stresses households' food security strategies while they try to strengthen or maintain the durability of their livelihood systems. It focuses in particular on changes in their strategies and the mechanisms they use to adjust during periods of high insecurity.

This approach involves identifying and using indicators that reflect changes in household behaviour and changes in the conditions under which they enjoy access to resources. Finally, it should make it possible to develop interventions that will support households' efforts to maintain or adapt their livelihood system and to assess whether the trend is toward more or less household food security.

Responsibility

Who should carry out the surveillance designed to enhance food security conditions? Who has the capability to reverse the trends toward insecurity? Who has an interest in establishing and maintaining food security, what is their interest, and what is its focus? The answers to these questions will essentially determine the choice of level and the development of a food security surveillance system. Because information is a prime decision-making tool, would it not be appropriate for the communities to hold this information? Are there valid reasons why they should be denied full participation in decisions on what information will be generated and how? Particularly in that community food surveillance systems (nutrition, food security, etc.) could also be an instrument of socioeconomic development (Immink 1988).

In the context of a community's participation in assuming responsibility for its food security, it would appear highly appropriate and advantageous for surveillance to be carried out in close cooperation with the community, from system design to the application of the results. Is a community not best placed to identify the specific causes of its own food insecurity and to take timely action within the limits of its available resources? However, because solutions may require resources that are not directly available to the community, the information generated by such a system should be made available to higher levels of surveillance or to other potential intervenors, i.e., anyone who, through actions, programs, policies, etc., has a direct or indirect impact on household food security.

Indicators

The selection of indicators is directly linked to the objectives pursued, and flows from the approach selected, i.e., the "food first" approach or the "livelihood systems" approach. One major implication of conducting surveillance at the household level lies in the complexity of the choice of indicators. Because of the nature of household food security mechanisms, it would seem unreasonable to look for indicators that are universally applicable, highly specific, sensitive, and stable over time, to measure the degree of security. The "livelihood systems" approach in particular calls for the use of multiple composite indicators. Moreover, as households adapt their livelihood systems, new indicators may be required to monitor new household behaviour. The relevance, specificity, and sensitivity of these indicators should, however, increase in line with their ability to provide an accurate reflection of the diverse and changing aspects of a livelihood system. The inherent challenge in this approach is all the more interesting because of its relevance and potential.

Units of Analysis

The selection of a basic unit for household-level analyses may present some difficulty in any field, including that of food security surveillance. In the extended family context in Africa, for example, where household structures may be both polygamous and monogamous, where self-help, family support, and resource sharing networks are highly developed, the economic model of the nuclear family, the one most frequently used, fails utterly to reflect the consumption or economic reality of the households of concern to us. Thus, in rural West Africa, there is still a question about whether to constitute the basic household unit around the head man of the family

compound, around the husband, or around a more distal unit composed of the wife and her children in relation to her husband. Each of these options would provide a different weighting for a number of significant factors in food security: cereal production, decision-making level, primary income source, distribution and consumption of food, etc. To assess the relevance of the choice of unit for measuring household food security, it is essential that we become more familiar with the dynamics at different household levels and in self-help networks as well as the actual role they play in the food security of individuals.

A Search for Alternative Indicators

Our exploratory research in rural areas of Burkina Faso in 1992 into identifying potential alternative indicators for household food security was inspired by some of these questions and gave rise to others. The approach we chose was closer to that of the "livelihood systems" approach. We attempted to identify these indicators on the basis of the peasants' perceptions of their food security, their food security strategies, and their adjustment mechanisms during periods of high insecurity.

Meetings with the peasants took place during the rainy season in two villages in the Department of Boulsa. We conducted focus groups in each village, followed by semi-structured interviews, spread over several interviews, for a total of approximately 3 hours each. Most of the households were polygamous, agropastoralists. Mossi was the overwhelmingly predominant ethnic group.

This study emphasized access to resources. The various types of resources covered by this study were broken down into three main categories, based on type of access: production, trade, or claims. Production refers to the production of consumer or utility goods, usually food. Trade refers, for example, to the trading of work-for-income, consumer goods or services, or the bartering of goods for other goods. Claims can include transfers without benefit in return, cash amounts or goods owing to a household or individual by another individual, the government, etc.

The primary results showed that the young children in these villages were the most dependent and had access only to resources from claims in the form of meals and treats (food) offered to them. Women had access to limited production resources (individual plots following work on collective land), trade (crops gathered, food grown, small-scale enterprises when their resourcefulness, capital, and husband permitted), and claims (millet from common land, help from family). Men had readier access to production resources (collective labour, individual plots, livestock raising), trade (millet stocks, livestock raising, skilled trade), and claims (credit, help from family, village groups, meals prepared by women).

Older women only had access to production resources through their individual plots.[1] Nevertheless, if their health permitted, they had greater access to trade resources through the small businesses in which they were often more freely involved. Their resources from claims were often

[1]They did not receive regular supplies of the millet grown on common land because they did not take part in work on common land.

limited to the assistance they could get from their children or from the headman during very difficult periods. Many were ashamed to ask for the headman's help and thus refrained from doing so.

The peasants described to us their primary food security strategies and their adjustment mechanisms, according to the extent to which they felt there was food insecurity. Initially, i.e., when they felt somewhat or moderately insecure, the peasants adjusted some of their strategies within their livelihood system. For example, they diversified their crops, traded cattle for grain, intensified their small businesses or livestock raising, etc. When their level of insecurity increased somewhat, they began to alter the type and amount of food consumed, for example, by decreasing the household's daily ration of millet from three to two servings per day. As their feelings of insecurity increased, they could change their livelihood system to adjust as well as possible to the situation, often, however, at the expense of making the system more fragile. Some households were obliged to adopt behaviour that would decrease their resources, such as selling their small animals, or transferring their labour to the fields of other, better-off households. At a later stage, they preferred to migrate for periods of days or weeks, beg and gather their food in the bush rather than eat the remainder of the grain that had been set aside for seed.

Most of these strategies were rooted in a desire to maintain the security of the livelihood system, rather than in a specific desire to maintain food security. The more households are forced to adopt strategies leading to destitution, the more the reversibility of their insecurity is compromised because of the increasing fragility of their livelihood system.

Potential indicators of food security were identified. They were classified either in categories corresponding to types of access to production, trade or claims, or according to categories that we have termed consumption and social. Within each category, they were also classified in a preliminary way according to our perception of the difficulty involved in using them, particularly with respect to data collection. This perception is based on the experience gained during this fieldwork. The indicators were also classified on the basis of their ability to predict insecurity in the long, medium, or short term and, finally, according to whether they provided mainly a reflection of local, household, or individual food security (Gervais 1993). The study did not, however, validate them, and this work remains to be done.

Examples of potential indicators identified in the villages might be an unusual increase in the sale of male animals to buy millet or a sudden increase in small business or services, which might be indicators of food insecurity in the long term (trade category). Whereas the fact that middle-income households firmly refuse to touch their grain supply would be a medium-term indicator (production category). Indeed, when they believe the situation is getting worse, these households stop drawing on their grain supply to keep their reserves until the rainy season.

An increase in demand for credit and an increase in begging would be short-term indicators, either for households or individuals (claims category). A drop in the number of meals per day and a decrease in the size of the daily food ration might, if observed at the outset, be relatively early medium-term indicators, because such changes can occur relatively early on in the evolution of feelings of insecurity. Eating sauce without *tô* (a staple millet dish) for meals, cutting off the distribution of meals to fieldworkers during the rainy season, or a shortage of *soumbala* (a condiment) in households would represent short-term or immediate indicators of insecurity

(consumption category). The dependence ratio, i.e., the relationship between the number of "workers" (contributors of resources) and the total number of individuals in a household might represent a long-term indicator, when interpreted along with other indicators (social category).

Although households' strategies probably always evolve from an adaptation to a destitution stage as food security lessens, households' specific behaviour, or the specific manifestation of each stage, is often unique to each community or group of households that share the same type of livelihood system in a relatively similar context. This represents one of the main arguments supporting the development of food security surveillance systems using indicators that are more community specific and based on a livelihood system approach.

Regrettably, as a consequence of a growing feeling of insecurity, some of the strategies used at a relatively early stage might seriously compromise the nutritional level of certain household members, especially children and pregnant or lactating women if their diet became inadequate. Before this stage is reached, it is essential for communities and all other parties interested in household food security to provide appropriate concrete support to the efforts of households in maintaining their livelihood systems.

This study enabled us, within a short period of time, to identify a range of potential indicators of household food security in this region of Burkina Faso. Its primary interest lies in the opportunity it provides toward the development of a community-based system for monitoring food security, a system that would use indicators that the population can readily understand and apply to conduct their own surveillance.

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Toward a Renewed Strategy of Support for Agri-Food Development in Africa

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Abstract *The theme covered in this paper is limited to the field of assistance that can be defined as "support for planning and agri-food policies in the countries of the South." This is a field of strategic importance for a great number of countries, especially in Africa, where poverty represents one of the most significant obstacles to development as the century draws to a close. Within this field, the context in which interventions occur and the means that we currently have available oblige us to rethink our methods and commitments. It is clear that a certain type of research is needed, now more than ever, to act as a driving force in these changes. The purpose of this paper is to review the current state of the deliberations that we are engaged in within the Agri-Food Strategies and Policies Team (SPAS) at Laval University, along with our colleagues from West Africa. The first part of this paper is devoted to laying out a conceptual framework for dealing with these questions of development and poverty. The second, shows how action-oriented research flowing from this conceptual framework can not only contribute to strengthening the institutions involved but also to clarifying decisions on policy by analyzing their impact on the targeted populations.*

Conceptual Framework

The "Growth-For-All" Paradigm

During the past 30 years,[1] theories of development have all rested on the paradigm that overall *economic growth* is the sole path for achieving any kind of development, and that the poorest sectors of the population would, in the end, draw real benefit from it (the trickle-down approach). Although everyone today agrees that such growth represents one of the necessary conditions, nevertheless, the economic and social facts of these last decades have shown that it is not a sufficient condition, especially in regard to the poorest levels of society.

Moving beyond a paradigm where growth feeds development... During this entire period, much attention has been paid to the growth of GDP, and more recently to growth of GDP per capita, but there has been little reference as to how the fruits of this growth are shared, nor to the concept of poverty that results from major inequalities in their distribution. The problem of development used to be seen as one of transforming "traditional" societies into "modern" societies through the growth effect, under the influence of very specific mechanisms, and following a path

[1]World Bank. World Development Report. 1990. Poverty: World Development Indicators, Oxford University Press, WA, US. See also, IFAD. 1990. The state of world rural poverty: An inquiry into its causes and consequences. New York University Press, New York, NY, US.

laid out in a series of well-known stages that are the same for all countries. This view was reinforced by the idea that these countries had the capacity to promote their own growth, as a result of their unlimited supply of labour.

This reductionist view, which ignores the richness and diversity of the countries to which it is applied, imposes *de facto* a dominant model of development, tested and promulgated by the North, which has most often shown itself to be dramatically divorced from the domestic realities and aspirations of peoples of the South. Nevertheless, it must be admitted that, in the majority of cases, economic growth has not been accompanied by the anticipated development, and that despite the considerable progress made in this area by the poorest countries in the course of the last 30 years,[2] the level of poverty remains the most worrisome feature of the end of this century.[3] This is a situation that places a heavy mortgage on any development strategy, and it is forcing us to rethink our approach to assisting the poorest countries.

In Africa south of the Sahara, the situation is particularly alarming, life expectancy there is 50 years, whereas it is 80 years in Japan, the mortality rate for children younger than 5 years is higher than 170/1,000, whereas the figure for Sweden[4] is barely 10/1,000. Africa, which is particularly hard hit by this situation, will be the only continent where the number of people living below the poverty threshold will increase by the end of the century. This state of affairs demands even more massive levels of intervention "even to stay at the 1985 level of poverty will require major efforts: GNP growth of 5.5%, radical restructuring of industry, intensification of agriculture and increased efforts dedicated to primary education, health care, nutrition and family planning."[5]

...to a paradigm where development feeds growth Economic growth then cannot be counted on to lead, in a systematic way and within a reasonable time frame, to development for the poorest and most vulnerable people in society. In this context, a strategy of intervention must be promoted, side by side with more classical growth support strategies, which allocates a larger role in development to the people at the lowest levels of society, in both rural and urban settings, who have not benefited, indeed have been marginalized by the impact of overall economic growth.

What is needed is a revised approach to supporting development. The approach should be one that is aimed at supporting growth by involving the poorest people from the time the intervention is being planned, and allowing them to take a more systematic part in their own

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[2]Thus, from 1965 to 1985, consumption per capita in the poorest countries increased by 70%, according to the World Bank, World Development report 1990, Poverty., along with welfare indicators such as life expectancy, mortality at birth, level of education, etc.

[3]The World Bank estimates that one billion people live beneath the poverty threshold in the most disadvantaged areas of the world.

[4]World Bank. World Development Report. 1990. Poverty: World Development Indicators, Oxford University Press, WA, US, p. 1.

[5]World Bank. World Development Report. 1990. Poverty: World Development Indicators, Oxford University Press, WA, US, p. 5.

development, improving their level of welfare and eliminating the state of poverty in which they live. Such an approach could be represented by the model described in Figure 1. The starting point for this approach is based on involving the poorest people in developing a strategy for improving their standard of living and meeting their basic needs. This means establishing strategies and implementing development activities aimed at reducing poverty, on a participatory basis, that respects the environment.

The impact of this strategy on economic growth and overall development should make itself felt through what happens at the margins of progress thus defined, in those economic sectors (agriculture and the informal sector) where marginal progress can be important and can be promoted inexpensively; through the participation of these sectors in overall economic growth and in the basic economic balance; through the reduction of inequalities and the tensions they give rise to; through better-suited economic, social, and demographic regulations; and through a lowering of the pressure on renewable resources, i.e., through a form of development that takes much more account of the environment.

The basic approach of such intervention is aimed at maximizing the contribution of the poorest groups to economic growth and to the exploitation of the resources available to them. It, therefore, involves both training and the input of human resources and a greater share in land, capital, labour, and know-how, using models that still have to be developed or promoted, by encouraging the involvement of the people directly affected.

This process must, in the end, be supported by putting in place institutions and policies that will create conditions where such projects can arise and be carried out on a participatory basis. It demands the rethinking of traditional policies so that they do not penalize such developments, fragile as they often are in their early stages of take-off. Indeed, projects may often seem to be performing poorly from the viewpoint of microeconomic analysis, particularly if they are judged by the established criteria of the dominant models. Nevertheless, their benefits, when evaluated at the macroeconomic level (redistribution, pressure on the environment, reduced tensions, and the search for a form of development that is more balanced and conflict free), should occasion a reevaluation of both their social and their economic relevance.

Need for an Agri-Food Vision[6]

Feeding people represents one of the basic social functions of any society, and meeting food needs is one of the fundamental goals of the human economy. This function is performed by a whole set of activities for creating and transferring "agri-food" products right up to their final stage of utilization: agricultural production, food transportation, distribution, and consumption. These subsectors that make up the agri-food sector are not only interrelated among themselves but they depend as well on other sectors to supply them with the essentials in intermediate goods (fuel, chemical product services, etc.), equipment (machines, construction materials, etc.), and services (marketing, mass distribution, research and development, training etc.).

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[6]The points contained in these paragraphs are a summary of the introduction to chapter 1 of part II from the work by Malassis, L., Ghersi, G., Agri-food economics. Vol. I. To be published by Cujas, Paris, France.

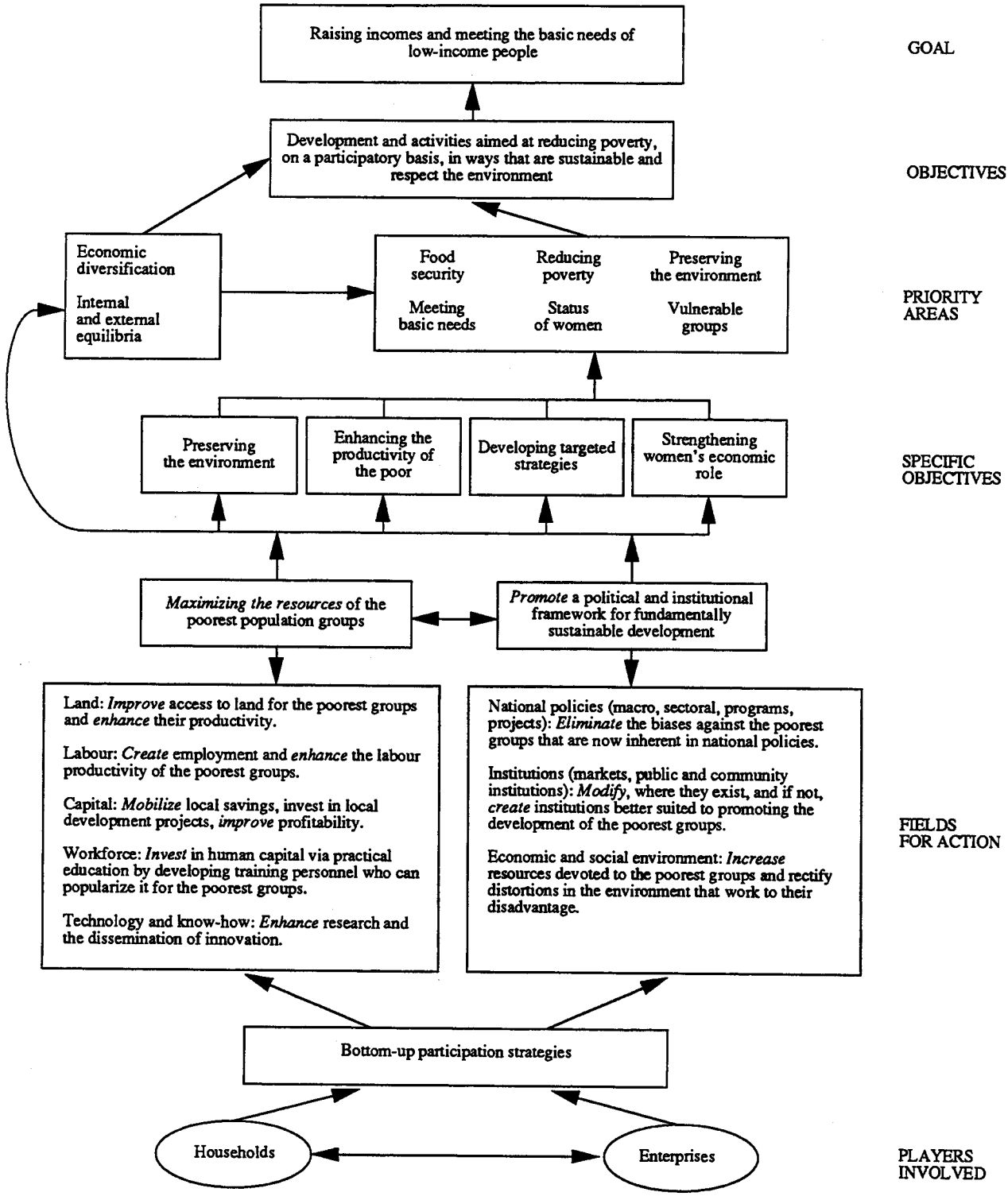

Figure 1. A new vision of development through greater involvement of the poorest people in overall growth and reducing poverty and inequality.

This is the approach that we have taken in our work. It is one that takes account of the whole set of players and activities that contribute to meeting basic food needs and that will largely determine the economic and social development of the poorest groups in society. This approach requires an analysis that articulates all the functional components, the structural components of the agri-food sector and all the flows that contribute to creating the final food product. The agri-food chain is complicated to demonstrate because, depending on the products, there are many possible routes. One particularly important aspect lies in the dynamics of the agri-food system and its relationship to the rest of the national and international economy with its flows of products, labour, capital, and foreign exchange.

At the microlevel (i.e., the economic agent) and the mesolevel (i.e., the agri-food sector), we can identify the production sphere, and the consumption sphere, with an overlapping area representing farmers' own consumption. The commercialization sphere provides the link between market supply and demand. Finally, macroeconomic policies have an impact on the production, commercialization, and consumption spheres. This outline of the agri-food sector is gaining ever wider acceptance (see, for example, the book by Timmer, P., et al. 1986. Analysis of food policy. Johns Hopkins, Baltimore, MD, US), because it makes possible a structured, dynamic, and interdependent understanding of what is a very complex phenomenon.

The sectors that make up the agri-food complex represent a heterogeneous set, most often containing several *socioeconomic subsectors* side by side: capitalist, small independent, cooperative, or state owned. This set is strictly determined as to its structures, its mechanisms, and its laws of development by the economy and the dominant models under which they operate. The functional and socioeconomic subsectors provide a matrix for demonstrating and analyzing the agri-food economy, one that has guided our basic methodological approach.

Selecting Time Horizons

There is a danger in focusing exclusively on the present and ignoring the past and the future. An examination of what has happened in the past will help us save time by not trying to reinvent what has already been studied. In looking at the development theories and programs of the aid agencies, we often get the impression that the field of international development is subject to periodic fashions, where too often a "new idea" is seized on that renders older approaches obsolete. Because institutional memory is short, it may be "discovered" a few years later that this new idea is nothing more than the reformatting of an older one. Such erratic progress is extremely inefficient and, for that reason, very costly in terms of development. Studying the past will also help us avoid repeating the mistakes of the past, now and in the future.

Above all, studying the past helps us to imagine and simulate the future. This forward-looking vision is indispensable to any society that wants to build its own future. It allows us to make our economic priorities clear, and provides us with a view of the major trends whose structural nature may put constraints on our development. We then have to take these dominant trends and draw up a range of alternative scenarios to be able to cope with a number of traps, be they technical, political, economic, or social, and to take short-term steps to protect our long-term interests. This forward-looking approach also helps us to understand the importance of certain

variables that may seem to change little over the short term, but that can determine our very survival over the long term: demographic growth, exhaustion of certain natural resources, disappearance of certain animal species, etc.

Selecting the Level of Analysis

There are two traditional levels of analysis, the macro and the micro. Most people involved in development work at the micro level, in projects such as developing irrigated rice culture, rural credit for women, nutritional education, etc. There is no denying the importance of basic development, but the best project in the world can fail completely if the socioeconomic context in which it must evolve is wrong, for example, if there are no price incentives, if commercial circulation is nonexistent or insufficient, if the exchange rate is overvalued, etc.

At the other extreme, there are the macroeconomists, with an economic view of society based on aggregation. They are right to insist that broad macroeconomic equilibria must be maintained over the long term. But in doing so, they often tend to neglect the social, technical, institutional, and political variables, as well as the diversity of situations among people and social groups.

Faced with these two extremes, we believe there are two important elements to bear in mind. First, we must be clear among ourselves about the levels of analysis. Although we may well prefer one level or another, we must remember the implications of the remaining levels. In fact, one of the essential preconditions for sustainable development is that all players in society must work coherently and in the same direction. The state may have the finest of development plans, but if it has not taken into consideration the objectives and the limitations of the principal microeconomic players, its plan will remain no more than a pretty document sitting on the shelf.

There is also an intermediate level between the "micro" level of the individual, the household or the firm and the "macro" level of an area, a country, or a region. We hear more and more now of the "meso" level, where the focus is on a set of microeconomic players who interact at generally the same operating level, or who are involved at different operating levels with a particular product. Thus, the horizontal level covers work in one particular sector or industry, whereas the vertical level deals with the production chain for a specific product. This is the preferred method of analysis for agro-food economics and industrial organization.

Link Between Research, Training, and Services

No matter how productive research activities may be, they will lose much of their relevance if they are not solidly rooted in their surroundings and closely tied to training activities for transferring their results through traditional teaching or continuing education methods. In the same way, research will be useless and ineffective if it does not flow back to those it is intended for: the poorest people, the extension workers, technicians, professionals, and politicians. In light of this, we must ensure that the process of defining and conducting research incorporates this dimension of service to society and that the institutions through which it operates are as solid and credible as possible. In this sense, institutional strengthening and proper training for the personnel who must disseminate and make use of the results of such research would seem to be important means for ensuring that research serves development purposes.

Empirical Approach at Laval University

Philosophy of Involvement

The SPAS team's philosophy of involvement is based on three guiding principles:

- First, because no one can pretend to undertake development for someone else, the team has instead given itself the role of working in association with a few institutions of higher learning and research in Africa to support their initiatives in the training and research fields. We hope to contribute in this way to strengthening Africa's human capital and the institutions involved by conducting joint research in agri-food economics.

- Second, given the importance of the links among researchers and decision-makers in Africa, the SPAS group tries through its involvement to promote action-oriented research that focuses on the impact of different development strategies and policies on the living conditions of the lowest levels of society.

- Third, because of the importance we attach to a forward-looking vision, we try to embrace both the short term and the long term in our considerations. We are, therefore, interested in studying broad trends, developing consistent agri-food strategies, and analyzing agri-food and macroeconomic policies in the context of these strategies.

By way of examples of this empirical approach that we have taken at Laval University, the following are two typical activities among those we are pursuing:

- SPAS group involvement in Niger, starting point for a regional initiative.

- Action-oriented research carried out in Burkina Faso in the context of the Study Centre for Economic and Social Documentation and Research (CEDRES) project.

Each of these activities represents part of a vision that embraces a form of agri-food development combining the three levels of involvement described in the foregoing and constitutes a set of components that are inseparably linked to a specific vision of regional development for West Africa.

SPAS Group Involvement in Niger

During the meetings of the Ouagadougou seminar (1989) on food strategies and policies, after a report had been presented on a food-adjustment simulation exercise in the Sahel, the Government of Niger expressed interest in establishing a unit to undertake forecasting and analytical studies of policies in the Studies and Programming Branch (DEP) of the Ministry of

Agriculture and Livestock (MA/E) of Niger. In October 1991, under the Canadian Institutional Support Program in Niger, a first unit was created within a support project for the Policy Analysis and Statistical Coordination Service (SAPCS) in the DEP of the Niger MA/E. The first phase of this project has been completed, and the second phase in now being developed.

The purpose of the project is to support the creation of a unit in the DEP of the MA/E that can use domestic resources to induce and guide thinking about national strategies and policies. This is an initiative based on human resources that is intended to help decision-makers in the conduct, not only of programs like the PCSA (Total Food Security Program), but also of other programs related to agri-food policies. The ultimate goal of this assistance is to help meet the basic needs of the entire population through agri-food programs and strategies by providing support to decision-makers in seeking better formulas for taking action.

The first phase of the project has made it possible to:

- Provide the Policy Analysis and Statistical Coordination Service of the DEP with computer equipment, databases on agri-food in Niger and tools for analysis and forecasting.

- Train personnel of the Policy Analysis and Statistical Coordination Service in the use of analytical and forecasting tools and in working with databases.

A first outlook study has been developed, using the basic tools, computer equipment, data bases, simulation tools (CAPPA), together with a series of selected training sessions, and technical and methodological support.[7] The outlook study for food demand in Niger is intended to show the potential evolution of food consumption over the long term, taking account of demographic trends and the macroeconomic situation.

The methodology employed can be divided into three periods. First, a retrospective portion traces past changes in demographic and macroeconomic trends, and in the food supply balance, against the perspective of major development policies. The second part represents a simulation based on hypotheses from past trends. The final part is intended to point to future directions in terms of agri-food policies and strategies. It is planned to present the results of this outlook study shortly in connection with a seminar that will bring together the principal managers of the ministries involved in food policy questions.

In the second phase of the project, cooperation will continue along the same lines of involvement (computer equipment, selected training of human resources, and technical support for conducting outlook studies to be used for policy development). In addition, there will be sessions in the form of seminars or annual meetings for rural development officers, for the purpose of disseminating the working results and the long-term training programs, to fill out the ranks of qualified high-level personnel who can lead the rethinking process without further outside help.

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[7]The SPAS group is currently working in association with FAO to finalize a new, modernized, and more powerful version of the CAPPA software program developed under the pseudonym K2.

This pilot project in Niger is currently the experimental basis for our involvement with Outlook Studies and Policy Analysis Units. It will help the research team to refine tools and methods that might be transferrable and adaptable to other countries of the area, because the problems of development are very similar among countries of the Sahel. A regional project to establish outlook studies units could be aimed at strengthening the capacities of the CILSS and its member states in analyzing and guiding agri-food policies with a view to improving decision-making in the choice of development policies and strategies.

One of the cornerstones of our support for the strengthening of outlook studies and food planning units concerns training activities. The critical lack of qualified personnel available to advise governments means too often that decision-makers must rely on foreign advisors. The lack of trained human resources, and the scarcity of available and reliable data, represent without doubt the two major stumbling blocks to the ability to make decisions that are truly the product of domestic thinking.

Bases for action As far as training and research are concerned, international aid has hitherto been conceived essentially as a transfer from North to South, and the higher levels of education have traditionally been provided by Northern universities, which thereby regularly drain off the best students from the South. This situation is slowly being corrected.

The institutional cooperation programs now under way between Laval University and various partners in the region have this philosophy as their starting point. The support project for outlook studies units was conceived with this in mind. These units were designed together with several West African universities and were allocated from the beginning with their cooperation.

The network concept A real network is in the process of being put together through institutional cooperation between Laval University and a number of partners in the South: CIRES in Abidjan, CEDRES in Ouagadougou, UNR in Rwanda, Meknès in Morocco, FAMV in Haiti, and, on a more modest scale, the Ecole Supérieure d'Agronomie (School of Higher Agricultural Studies) in Niamey. The amounts that have been invested in this type of cooperation are great enough to have a major impact on the teaching and research capabilities of these bodies (several million dollars in each case).

A clearly understood partnership By progressively putting institutions on an equal footing, with some degree of specialization of teaching and research teams, we can imagine creating partnership mechanisms that will be much more fruitful for everyone concerned. In the teaching field, there can be teacher and student exchanges in both directions; also, with the "equivalences" system, we can more closely integrate our pedagogical courses and meetings and discussions on our programs and teaching methods, enriched by a new vision and the different experiences that are especially important in the field of development economics. In the area of research, better partnership can strengthen the quality of our work through new forms of North–South cooperation that bring theory and fieldwork together.

Action-Oriented Research in Burkina Faso

Objectives of the CEDRES/LAVAL Project The CEDRES/LAVAL Project is intended to help improve our understanding of the food situation in Burkina Faso. Its main objective is to improve

the development of food strategies and policies by providing decision-makers with rigorous analysis of the impact of various policies on microeconomic players (producers, merchants, consumers) and especially measures undertaken within the PASA program for agricultural sector adjustment. Support for CEDRES at the University of Ouagadougou should help to build up a national research team capable of carrying out key studies in the area of impact analysis for agri-food policies.

The specific objectives of the Project are to:

- Enhance knowledge of Burkina Faso's agri-food systems especially the objectives, constraints, and adaptation mechanisms of microeconomic players within a structural adjustment context. Particular attention will be paid to analyzing the social dimension of adjustment.

- Take part in scientific and technical exchanges among various players involved in the fields of collecting and analyzing data in Burkina Faso. This work will involve different aspects of research and, in particular, help with defining methods of inquiry, proposals for choosing software and data analysis techniques, and coordination for better information management on food security with other players involved in data collection, especially the MAE.

- Strengthen the capacity of national researchers in preparing practical recommendations to decision-makers concerning agri-food policies and increase the level of exchanges and collaboration among researchers and professionals from MAE and INSD.

- Strengthen CEDRES' research capacity through scientific exchanges and joint research projects.

The project includes three components: a research component (the main one), a training component, and a management component.

Research priorities among researchers and decision-makers Among the first activities that really marked the launching of these scientific activities, was a seminar on priority research questions in the agri-food policy field held in Burkina Faso. This seminar was a workshop that brought together decision-makers from several ministries and specialized researchers in the areas of agriculture and economy and led to the publication of a research agenda for the CEDRES/LAVAL Project. This document gives a record of the seminar and also provides a set of research themes that were considered to have priority in the area of agri-food policies and adjustment.

Although some of these themes will need to be modified to take account of new economic policy choices that will be adopted under the structural adjustment program, the agenda, nevertheless, has served us from the beginning as a guide in developing research methodologies for the project. The main research areas of the CEDRES/LAVAL Project, finished or under way, are:

- A study of how the rural population perceives poverty and food security, and development of a rural poverty profile in Burkina Faso.

- The impact that a possible devaluation of the CFA franc might have on Burkina Faso's agri-food economy.

- An evaluation of incentives and comparative advantages in the irrigated rice-growing sector.

- The impact of credit reform on the production and management of natural resources.

Setting up a food systems observation post This observation post is intended to improve knowledge of living conditions and rural household behaviour in the area of food production, marketing, and consumption to see the impact of different economic policies, in particular, structural adjustment.

A permanent survey was set up using a restricted sample of households (290 for the whole country), carefully selected from representative agroeconomic zones, and was monitored over a long period of time to capture variations within the year, and from year to year, in the behaviour of households. This permanent survey was complemented by selective mini-surveys focusing on specific themes.

Once a zonal plan of Burkina Faso's agroeconomy was drawn up, we selected four areas for study. A base survey was carried out in these zones to identify the villages selected and to perform a census of the households in those villages, and thus to provide a survey base from which to draw the sample for the permanent survey. Based on information gathered while identifying the study areas, we were able to prepare a summary covering the different villages and markets selected for the project's permanent surveys.

Cooperation with other surveys in progress By way of example, the project agreed to provide support to the priority survey being carried out by the National Institute for Statistics and Demography (INSD), the "Statistics Canada" of Burkina Faso, and to the agricultural survey conducted by the Ministry of Agriculture and Animal Resources (MARA). This support focuses mainly on upstream, presurvey activities (survey preparation: sampling, questionnaires) and downstream ones (data analysis, recommendations to decision-makers).

In the context of launching the Food Security and Nutrition Project (PSAN) of the Ministry of Agriculture and Livestock (MAE), financed by the World Bank, the CEDRES/LAVAL Project conducted a basic study on socioeconomic conditions and household strategies regarding food security in the province of Passoré. This study helped provide the information needed by decision-makers to start up a program to improve economic and nutritional conditions for households in that province.

The project worked in cooperation with the Demographics Teaching and Research Unit (UERD) and the Statistical Information Coordination Committee (CCI) of the Agriculture Ministry to organize a seminar on coordinating statistical information. This seminar allowed officials from

various ministries and from the research centre to take part in a technical workshop on how to design and query databases.

Information for decision-makers and training for researchers in Burkina Faso Research results are disseminated through publications, including preliminary working papers and summary notes, and by organizing specialized seminars that bring together researchers and decision-makers. The project is contributing in various ways to the development of human capital in both Burkina Faso and Canada:

- Continuing cooperation between Burkina Faso and Canadian researchers at different stages of research is useful for everyone, with our Burkina Faso colleagues contributing their knowledge of the region, for example, and the Canadians bringing new research methods and a knowledge of the relevant literature.

- A seminar on research methodology was organized by CEDRES researchers interested in the project.

- Young Burkina Faso researchers have been hired and given an active role at various stages of the research. They receive educational bursaries to come to Canada and, thanks to the project, can make progress toward their doctorates from the University of Ouagadougou.

- Some masters candidates from Laval University have conducted their research under the project and have shared their knowledge with Burkina Faso colleagues interested in their methodology.

Conclusion

We are beginning to see the fruits of this commitment to support agri-food development in West Africa through the strengthening of local teams, the promotion of applied research projects designed and developed in partnership with political decision-makers, and the care taken to adopt a networking approach with as many teams as possible involved in research, training, and regional planning.

The focal points of this network are still the universities and research centres in the region, but the effects of action-oriented research projects, conferences, and continuing education activities are giving rise to a real dynamic of agri-food development in West Africa. The strategic stage of carrying out these various projects is now leading to a second phase. In this next phase, the Ivory Coast Economic and Social Research Centre at the University of Abidjan and the Economic and Social Documentation and Research Centre at the University of Ouagadougou in Burkina Faso will be playing key roles as centres for research and development. These organizations are already very active within the African universities network and are able to grasp the dynamics of trade between the Sahel zone and the coastal countries and turn it to the advantage of regional development.

The Pastoralist's Dilemma: Common Property and Enclosure in Kenya's Rangeland

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Abstract *Despite the need of pastoral communities to practice mobility to benefit from widely dispersed resources, the African rangelands are going through a progressive process of enclosure and privatization. Privatization has been supported by the tragedy of the commons arguments, and the application of our "prisoner's dilemma" to stocking decisions. The "pastoralist's dilemma," however, is applicable primarily when common property resources are appropriated during the enclosure process, when rightholders, seeing their land treated as an alienable free good, demand their privatized shares before that share disappears. The "pastoralist's dilemma" occurs not when rangeland is controlled by communities but when community control is undermined by state or private interests. When the integrity of the community domain is threatened, the individual pastoralists has no choice but to accede to the generalized enclosure of range resources, despite the fact that this is against the individual and collective interests of pastoralists in maintaining higher degrees of mobility, sustaining desirable levels of productivity. Yet communities may well offer the best framework within which local goals and "development" can be realized.*

The African rangelands have long been held under various community-based systems of resource allocation and management. Some systems give an almost exclusive emphasis to animal husbandry, others combine animal husbandry with dryland or irrigated cultivation. Pastoral domains have generally been quite large, allowing a pasture-holding group access to varied resources across several ecozones sufficient to maintain herds through most years (Bonfiglioli 1992). Among the Maasai of Kenya, the need to move herds more widely in drier years has been met through appealing to the political and cultural linkages between sections. It has been on the basis of these two institutions, of section-based domains of common property and intersectional agreements, that movement of livestock has been assured between the variety of resources on which extensive husbandry depends (Galaty 1988).

But over the last two decades, dryland communities have been moved to begin the enclosure of Africa's rangelands: explicit demand has been exerted by policymakers, governments and local elites, and implicit pressure has resulted from local population growth, immigration and economic and educational diversification (Lawry et al. 1984). A case in point is the experience of Kenyan Maasai, for whom the enclosure process is probably further advanced than for any other rangeland area in Africa. Some 20–25 years ago, in the former Trustlands of Kajiado and Narok Districts, group ranches were formed (Davis 1970; Hedlund 1971; Halderman 1972); today, rather than having evolved into stable communities of land ownership and management, most of these groups are in the process of dissolution through being subdivided among their members (Grandin 1986; Galaty 1992).

The most influential argument supporting subdivision derives from a set of intertwined assumptions regarding the predicament of managing common resources; this "tragedy of the commons" theory argues (Hardin 1968):

- That wise, long-term management of collectively held range resources is undermined when the returns on those resources are realized by individuals; short-term interest in maximally exploiting pastures leads individuals to increase the herd using the commons, resulting in the degradation of pastures;

- That long-term investments that improve range resources, thus raising range and animal productivity, are discouraged if individuals cannot be assured of realizing the benefits of the investments they make; and

- That unless land is seen as a commercial, marketable good, there will be no incentive for herders to seek higher returns, by increasing the quality or quantity of animals raised or by developing more commercial strategies of livestock production. In contrast, it has been assumed that subdivision will create conditions enhancing the quality of resource management, the level of investment and the degree of commercialization.

These three assumptions, involving management, productivity investment, and commercialization, underpin the theory of privatization (Toye 1987; Bromley 1989). Similar arguments supported the formation of group ranches, a program of privatization in which a specified membership holds freehold title in a particular parcel of land (Galaty 1980). But the current process of subdivision adds "individualization" to "privatization," reinforcing the faulty notion that collectivities are intrinsically ill-suited to holding property (Bromley 1991).

In this paper I will examine the stated goals, values and motives of Maasai pastoralists, both those who support and those who reject subdivision of their group holdings. I will, in particular, try to assess the logic behind the attitudes expressed by herders and to model the nature of the predicament that underlies their judgments. To what extent are herders' responses understandable as rational choices made in light of the options they face, and to what extent should they be seen as reflections of larger societal shifts, toward an ethic and ideology of modernization and a discourse of development?

This question is an important one, arising at a time that the arguments for privatization, schematically posed earlier, are coming under increasing criticism (McCay and Acheson 1987; Bromley 1991; Bazaara 1992). Many now argue that common property systems are in fact viable means of managing environmental resources, and that resources held in private hands or by the state are often more subject to degradation and abuse (Ostrom 1991). Comparisons of common-property and small-scale individual and large-scale private land holdings have often shown the former to be more productive than the latter (Cossins 1992; Lawyer 1992).

The obvious influence of tenure forms on food systems flows not only through the effects of property on access and use of resources, and the resulting productivity of land; it also flows through the distribution systems established by property rights. In this regard, community-based forms of management often respond more adequately to questions of equity and social justice in the allocation of rural resources and the distribution of returns, arguments of some significance when the communities in question may be poorer or political less powerful than those making the decisions that affect them (Chambers 1983; Baxter and Hogg 1987). Thus there are two sets of criteria that we should consider in assessing the viability of land-holdings systems: those of resource management, productivity-investment and commercialization; and those of equity and social justice.

Pastoralism and the Prisoner's Dilemma

Is range enclosure a necessary response to the apparent contradiction between the individual and collective interests of herdowners, a contradiction often seen as undermining responsible rangeland management? Enclosure has been advocated by those who argue that cooperation in managing common property is virtually impossible, given this divergence between collective and individual interests. Modelling the strategies pursued by pastoralists, variants of the "prisoner's dilemma" have been applied to the "game" played by herders using common grazing. In the "prisoner's dilemma," two confederates in crime held separately, neither able to communicate with the other, have the option of confessing or not confessing (Ostrom 1991, p. 217). If one prisoner alone confesses to their joint crime, he will receive the most lenient sentence, whereas the partner who has resisted will receive the stiffest penalty. If both confess, they will both receive a stiff but somewhat less severe punishment. If neither confesses, they will be charged with a lesser crime for which they will sentenced to a punishment of medium severity, more strict than will be given the sole confessor but more lenient than would be given to each if both confess.

Under the circumstances described, neither can be sure the other will not confess, so would normally be expected to "defect" from any agreement not to confess because the worst situation would be to resist while the other confesses. The dilemma is that the cooperative solution is best for both taken as a pair, but with communication impossible and under the threat of losing all if one confesses, it is likely that they will reach a solution less desirable for either, when both confess.

Given an upper limit to the number of animals (L) a given pasture can support, a certain number of herders (X) can follow one of the following strategies:

- In a cooperative strategy, herders will each graze an equal number of animals on the given pasture (L/X), thus receiving a certain profit.

- A defect strategy is one in which one herder "defects" from the cooperative strategy by grazing more animals than are allowed (> L/X), thus garnering a higher profit at the expense of those who do not defect, who receive negative profits.

- If every herder defects, however, overstocking will result in a lower profit for everyone.

Without a binding contract, the argument goes, each herder will suspect that another might defect, so will see it in his interest to defect himself. The hope of defecting alone and the fear of suffering another's defection conspire to lead each herder to cede the cooperative strategy which would in fact benefit the collectivity. According to the account, the tragedy of the commons is inevitable unless an overarching authority dictates stocking rights, as in state property, or pastures are privatized, so the incentive to gain a "free good" in the form of extra grass will be gone (because being owned by someone, pastures are no longer free).

However, in the real world, most pastoralists measure numbers of animals rather than profits; a thin animal may be unprofitable at the height of a dry season, yet if it survives it may increase in value when it is fattened or becomes fertile the next year. On nonenclosed pastures, most pastoralists do seek herd increase. From the management point of view, there is much to commend an "opportunistic" herding strategy that seeks to bring as many animals as possible through a dry period, increasing the potential for future herd growth (Sandford 1983). Despite high levels of herd loss in given years, this strategy may result in greater numbers of animals being "carried" over time, for a net gain in range productivity (Behnke and Scoones 1992). But is the rationality of this "defect" strategy necessarily at the long-term expense of rangeland degradation?

Recent findings in range ecology suggest that the notion that there is an absolute limit to the number of animals a pasture can hold (its "carrying capacity"), which can be calculated, is just too simple, since vegetation potential is too complex in nature and too discontinuous in space, and too varied in quality and quantity between seasons and years, to be able to predict accurately (Behnke and Scoones 1992). Herders empirically monitor pasture capacity through continuously assessing the quality of their animals and their milk yields, and respond to declining pasture quality by shifting animals to new areas, selling them or trying to minimize their energy expenditures. But ecologists now argue that rangeland degradation is not primarily due to livestock numbers in many "nonequilibrium" grazing systems, found in drier environments for which climate and vegetation vary unpredictably (Behnke and Scoones 1992, pp. 17–18). Rather, the major predictor of vegetation change is climate, more specifically rainfall. Without rain, annual grasses in arid regions tend to shrivel, dry and disintegrate independent of the extent to which it is grazed; thus their nutrients are either captured by ungulates or lost.

If we consider the pastoralist dilemma with respect to the number of animals each can sustain on common resources, the following choices are evident. Under a cooperative strategy, each would be limited to an equal share of a fixed herd (usually assessed according to sedentary and commercialized herd standards). But the number of animals each owner could manage each year, and the size of the total herd, would usually be less than a herd owner would raise under a more opportunistic strategy. In comparison to the sedentary fixed-herd model, an opportunistic strategy would result inevitably in differential herd sizes, and greater animal numbers in good years, fewer under drought conditions. Thus, pastoralists routinely pursue "defect" strategies by managing their herds for growth (Sandford 1983).

But several conditions underlying the "prisoner's dilemma" model do not hold for the "pastoralist dilemma":

- There does not seem to be a specific ascertainable limit to the number of animals a given parcel of rangeland can carry, since pasture quality and quantity varies along with microecology and variable climate. Of course, the limits of a given parcel of pastureland is ascertained at a particular time by the herder, who carefully monitors the state of his animals; at the extreme, animals weaken and even die, indicating that pasture limits have been exceeded. A cooperative strategy based on a binding agreement, especially one enforced by central control, to limit herd numbers would curtail management flexibility and would inevitably result in lower range productivity over time. In dry, nonequilibrium systems, it would appear that this sacrifice will not result in a less degraded environment.

- Herders are not ignorant of one another's decisions regarding animal holdings and pasture use, since they often practice rapid communication about the herding process. Thus their own strategies are not driven in the first instance by fear of what competitors might do; pastoralists usually have fairly accurate information about what one other is doing. They discuss their dilemmas and coordinate their herd movements.

- Finally, it does not follow that if everyone "defects" the results will be uniformly negative as would be the case if the pasture pie were finite; in fact, aggregate pasture resources differ according to climatic factors, so even if the defect solution is ubiquitously adopted, in many years everyone will reap the benefits. Only in very dry years do the contingencies of herd survival seem to create a zero-sum game. And since severe droughts seem to affect large herd owners more than small herd owners, the outcome may well be to level rather than exacerbate herd inequities.

My argument is that under normal rangeland conditions, the model of the prisoner's dilemma is not applicable to pastoralist stocking decisions. Or, to put the matter somewhat differently, the effect of all pastoralists "defecting" from a conservative fixed-herd strategy is not a lower but a higher aggregate outcome, so individual rationality and collective interests usually coincide under rangeland conditions. Curtailing the flexibility of herd managers to move herds in a rapid and opportunistic way to exploit rangeland resources that rapidly vary over time and space is the major factor undermining pastoralist productivity. This is, of course, a major outcome of range enclosure, as communal pastures are privatized and subdivided, and individual parcels fenced and nonresident herds excluded. It would appear to be the case that even generous apportionments provide inadequate variability of resources to allow a herd to remain resident throughout the year, especially during drought. When private and communal holdings exist side-by-side, the herds of individual land holders inevitably make use of communal pastures, while the reverse does not hold.

My question is this: if, as has just been proposed, it appears to be in both the individual and collective interests of pastoralists to retain flexibility of movement only possible on large, communal holdings, why have many Maasai pastoralists called for enclosure of the rangelands through subdividing group ranches?

The Logic and Function of "Groups"

The notion of the "group" was a compromise between communal and private forms of land tenure, especially suitable for arid and semi-arid regions in which range resources were exploited in an "extensive" fashion (Galaty 1980). Group ranches, as founded in Kajiado and Narok Districts, exercised three functions: land-holding, resource management, and community organization. Many group ranches still function in this manner, and even when subdivided still serve as units of local identity and community organization. I have long been curious about what factors may be crucial to the success of cooperative organizations such as the group ranch, and conversely under what conditions they do not work. Let us consider the logic of the group concept, keeping in mind the question of what factors have led to its demise.

The "group" is a definitive collectivity that stands in an exclusive relation to a precise tract of land, over which it holds private title. After the tract of land was adjudicated, a committee of representatives was struck, one of whose responsibilities was the enumeration of its membership. Although the title holders include registered members only, they are drawn from a community considered in general to have held customary rights of occupation; so registered members are considered to hold land *on behalf of* that community, from which subsequent members can be drawn. The functions of the group, to hold land, manage resources and represent the community (as well as propose and ratify new members and allocate land through subdivision), are normally exercised through its management committee, the "group representatives" (Kituyi 1991).

It was thought that group ranches would provide security of land tenure to a pastoral community, leading to increased investment and greater range productivity. But security of tenure could be ensured only through limiting membership to a specified group, legally securing group land rights through acquiring title and protecting the rights of each registered member to an unspecified but equivalent share of group assets. One entailment of secure title was the right to exclude nonregistered people from occupying group holdings, but this right has in practice been applied only to noncommunity members. Although legal rights are only held by registered members (i.e., almost exclusively adult males), their family members and nonregistered community members have been seen as retaining certain rights: of residence, of potential inheritance and of eligibility for future membership (Okoth-Ogendo 1991).

Undermining Group Ranches

Unfortunately, many of the requisites of success in managing group ranches were not fulfilled in the actual implementation of the program in the two Maasai districts. Security of tenure was undermined when group membership was not limited, share-rights of members were not protected and exclusion of noncommunity members was not achieved. At the same time, an

inexorable process of individuating and subdividing group holdings continued, based in part on the precedent established at the time of the original adjudication of certain individual holdings side-by-side with group ranches. Government agencies and officials have been deeply involved in encouraging and benefitting from subdivision, which represents an extra-legal if not illegal process, to the extent that we must doubt the good faith of government in implementing the ambitious and costly group ranch program. Failure regarding membership has undermined group ranch cohesion and faith in its management committee, both necessary conditions for securing productive investments in the form of credit to the group.

On the basis of what was seen as customary practice, only adult males were normally registered as group members, with women and children gaining rights through fathers and husbands (although in some cases widows with minor children were registered). When young men came of age, through local initiation and receiving a national identity card, they were registered as group members. This obtained for the age-set formed in the late 1970s (*Irang'irang'*) and early 1980s (*Ilkipali*). By the late 1980s, however, population growth had swollen the number of potential recruits and pressure was growing for subdivision. Thus, on the even of subdivision whether the new age-set would be registered as members, or made to share in their father's estate, was vehemently debated, leading to violence and court cases.

Some registered members protested that registering the new age-set would give an undue advantage to families which had produced many children at a time everyone was aware that smaller families were being encouraged. Although each original registrant gained an equal share when the group was founded, that share was seen to be diminished when names were added to the register. On group ranches where registration of the young men was denied, the latter argued that by customary law their right to hold and use land was acquired through initiation and maturity, that is via the community, rather than through their fathers. Some were also aware that their father's held the legal right, as yet not exercised, to act as sole owner rather than family trustee of the land, and could both evict and disinherit sons.

Some group ranches decided to register the new age-set, while others decided against it. On Elang'ata Wuas group ranch, in Ilodokilani section, conflict arose between the new age-set and their titular age-set sponsors (*Iseuri*), who were primarily responsible for refusing to grant them registered status. The decision led to a breach of peace, as the younger set attacked their unhelpful sponsors, while the latter responded with a ritual curse. Because a more senior set was registered while the new age-set, their pair, was not, the integration of the two into a single age group in subsequent years, dictated by age-set procedures, was cast into doubt. This case is expected to come to court, and ranch subdivision has been delayed through court order (Galaty 1993a).

One of the factors stimulating resentment on the part of young Maasai men denied registration is that many people without any customary residential claims have been registered as group members. These include many nonresidents who are both Maasai and non-Maasai, most of whom have some degree of political influence. The presence of non-Maasai within the Maasai districts was subject to much discussion and administrative deliberation during the colonial period, when the Maasai districts were theoretically "closed" to outsiders. Despite this fact, numerous Kikuyu established personal and family ties with Maasai, many becoming "acceptees" over time. Many such Kikuyu with long residence and ties with Maasai were registered as group members and

expect to receive portions of land upon subdivision. It is usually recognized that long-resident non-Maasai should be allocated portions.

Many who are clearly outsiders to the region, however, have sought and gained registration status, including recent migrants who have arrived anticipating subdivision and nonresidents who through influence or bribery insinuate their names. As has been pointed out by outraged Maasai denied registration, most committee members are nonliterate and many have not proven incorruptible. The Group Representatives Act stipulates that two-thirds of the committee must concur to add a name to the official register, which in practice means 6 out of the usual 10 members. Altering the register, however, is often done with the signature of only one or two members, most often the chairman and secretary. In other cases, the District Commissioner, a District Officer or the Director of Lands in the Ministry of Lands and Settlements, with neither the agreement nor the knowledge of ranch officials, procure changes in the register. Thus, ordinary group ranch members have watched for years as more influential members have eroded the collective domain through acquiring title deeds for individual parcels of group land, which often have been subsequently sold. Nonregistered Maasai residents have seen the registry swollen with names of politicians, civil servants, and businessmen, Maasai from other areas or non-Maasai from outside the district. Several cases of outrageous abuse have occurred, in Mosiro, Ewuaso Kedong' or Lodariak, to mention the most noted cases in Keekonyokie location (Galaty 1993b). But the progressive carving up of group land and the insinuation of outsiders has occurred virtually everywhere in the two districts, undermining the ability of group ranches to serve as communities able to manage their resources in common.

Why Subdivide? To Resist or Defect

What has influenced Maasai to seek rangeland enclosure (subdividing group ranches), and what influences others to continue opposing it? In general, access to undivided rangeland is a condition for reaping the full benefits of pasture resources by a livestock-keeping community. So it should be no surprise that subdivision would benefit individual claimants who lie outside the animal economy.

Cultivation informally encloses land by inscribing the signature of an individual's labour on the landscape, marking residual rights over fields and furrows. Others who lie outside the immediate productive community of pastoralists are urbanites and the rural bourgeoisie, namely civil servants, politicians, professionals, businessmen, who, despite the diversification of their economic interests, have retained local land rights. This elite, whose incomes are largely derived outside the animal economy, can only partially renew reciprocal ties that bind them to the community. As long as their rights to land are mediated by the community, as occurs when they are merely members of a group, their special access to power can only be partially realized. So it is undoubtedly in their interest to gain individualized portions of land, which they often do on quite favourable terms.

The question is not why peasants and a more elite class would seek subdivision, but why they would be allowed to do so, and would even be joined in doing so, by the vast majority of pastoralists who, it would seem, can as a collectivity only lose in the process. Earlier, I set forth

several reasons why the prisoner's dilemma is not a useful model for understanding strategies of pasture allocation and stocking rates. However, with respect to allocating land, when classes differ in access to power and information, the prisoner's dilemma may offer a useful model for understanding the range of options facing pastoralists. Below, I will illustrate the "pastoralist dilemma" through presenting select Maasai commentary on the desirability of subdivision.

One viewpoint holds that it is desirable for pastoralists to maintain general access to commonly-held land, since undivided land can overall support more animals than divided land, and thus can provide greater economic security for the community as a whole and higher returns on their animals. One elder of substantial ritual prominence in Keekonyokie location commented that subdivision was "no good", since it would lead to decrease in cattle numbers, limits on movement, and isolation of people (Galaty 1993b, p. 6). Another man observed that subdivision was bad because "there will be no freedom (of movement) like before", a view reinforced by comments by yet another elder, that subdivision was bad "because during our time, before this came, we used to go everywhere looking after animals, but now it's impossible."

In addition to halting herd mobility, subdivision confronts the pastoralist with the dismal scenario that fragments of land may be sold piecemeal, leaving future generations with a heritage of dispossession. One Maasai observed that subdivision is regrettable because the "the coming generations will never have something like land to own, not unless his family will have been good enough to leave some for him," another that it is bad "due to our land being taken by (other) people", a third that "there will be less land, and fewer people." "Some people will stay landless the whole of their lives, although they also desire to have land." From this point of view, subdivision is seen as bad "because some people sell their land and finish it;" due to sales, "the land is becoming small and the coming generations are angry with us." Subdivision has stimulated animosity: "hatred has grown since individuals own their own land and do not want neighbours to interfere."

In light of these notions about why subdivision is collectively undesirable, we might speculate that subdivision would be accepted or sought out under one of the following two conditions, one economic, the other cultural: (a) if the anticipation of potential individual gains or the threat of individual losses outweighed the perceived benefits of resisting subdivision (the rational choice argument); or (b) if the ideological framework within which privatization is presented proves compatible with the evolution of individuals' motives, goals and interests (the modernization argument).

Fear of loss can strengthen desire for gain. It might be assumed that, if subdivision must occur, it would be in the general interest to do so relatively equitably, especially if possible inequities were distributed randomly. But of course this is rarely the case. Those able to gain more information about how land will be allocated, more power to influence that allocation, and thus obtain more allocated land than would be their equitable share, will inevitably "defect" from the default strategy of seeking equitable subdivision, despite the fact that the principle of equity is specified in the relevant legislation, though roundly ignored. Pastoralists come to know that the option to subdivide, and to subdivide inequitably, has been, is being and will be pursued by elites with privileged access to power, information and land. Thus, they are faced with the option of resisting subdivision, with the possibility of facing dispossession later, or of supporting subdivision, to gain something now.

Resisting subdivision would be to a pastoralist's benefit only if the strategy were generally followed, but to his loss if others continued to defect, thus further eroding the residual land base. Faced with demands for land by those predisposed to individual ownership and with the threat of defections in their own numbers, it would be rational for pastoralists themselves to defect. Echoing calls for enclosure, many pastoralist must inevitably feel satisfied relief upon receiving a portion of land. But others feel secure in their traditional neighbourhoods and refuse to seek land or fight those with theoretical claims over their own pastures, in the belief that their indigenous rights should prevail over legal manipulations.

Numerous respondents indicated that subdivision was a good thing because population increase would make shares smaller if allocations were made in the future. Subdivision is not bad since "there would be increase of people and fewer acres when divided." Subdivision is good because "as time goes by population increases and land does not increase. So this will lead to much smaller portions than what we now have." In the future, "there would be increase of population, and there would be big clashes against grabbing of land". It is not bad to subdivide, rather "it is good (now) when people are few and *shambas* (individual farms) will be available, but a few years to come people will be many." Finally, "if we just continue undivided, the population is also increasing, and so it is advisable to divide when our population is still less."

Side-by-side with the rationality of avoiding risk and seeking gain is the cultural rationality of "maendeleo," the ideology of "going forward" to development. "Maendeleo" is a set of notions, presented in meetings, diffused through churches, affixed to projects, signified by schools, and ratified by the state, which suggest that the traditional life of pastoralism is of less value than vague images of what a future without nomadic movement might be. The discourse of development is reflected in commentary on subdivision, since "owning one's own land" is proposed as a hallmark of progress. A plurality of respondents assert that subdivision is a good thing because then everyone will own their own ranches and be able to develop themselves. Subdivision "created ownership of land and proper settlement, without any moving any more." So curtailing movement, regretted by some since it will negatively affect herding, is praised by others as opening the door to "civilization": "it creates ownership and greater civilization within individual ranches;" "many people have acquired ranches and civilization has prospered." What is especially valued is that "we own land by ourselves," and "a bit of progress in the land is practiced." Gaining individual land is thought to "bring awareness in the society, and development in general."

The reasons given for subdivision reflect awareness by pastoralists of their material predicament, but also illustrate the embrace by many of the general ideology of privatization and development. The "pastoralist dilemma" lies in the coincidence of two streams of influence: the disjunction between collective strategies for preserving and individual strategies for enclosing common pasture resources, and the profound assimilation of the assumptions of development discourse, of which the desirability of privatization and individualization of land is one manifestation.

The Requisites for Successful Groups

The group title seemed to represent one means of ensuring that the rights of a community to a given domain of land would remain inviolable. But with expansion of registered members,

often illicitly, each share was in effect diminished in value. At the same time, the value of shares was diminished each time an influential member managed to acquire title to an individual parcel within the group holdings. Thus members of groups not only saw their number grow but their domain shrink. Increasingly, members, whose long-term interests would have been well-served within an large, integrated and coordinated collectively-held ranch, sought comprehensive subdivision under the assumption that they should claim something now or gain nothing later. After the integrity of the group domain had been fractured, there seemed to be no solution other than to give to each his rightful share.

Under what conditions might communal or group holdings prove viable in the African rangelands? This is an important question since the Maasai districts may yet prove to be an exception rather than a bellwether. Although the more fertile areas of rangeland, along escarpments, rivers, mountains, swamps, are underdoing pressure for enclosure, private holdings seem so impractical for meeting the needs of extensive animal husbandry that many experiments in collective land holding and cooperative organization are still under serious consideration.

First, a definitive membership should be established and a defined community from which members are drawn, and to which they are responsible. Second, nonviolability of titles should be legally confirmed, as well as the nonpartibility of shares. Third, the power to exclude non-members and outsiders from the domain should be provided. Fourth, loans should be restricted to productive investments, realized by individual families. Fifth, it should be ensured that group holdings are large enough to ensure flexible allocation of resources, but small enough to maintain internal social cohesion and monitoring of officials. Sixth, bribery and corruption should be met not with benefits of land but with legal redress. Seventh, individuals should be allowed to define strictly limited areas within the group domain for family use, but without title or right of partition, sale or transfer of these holdings.

The Maasai group ranch experience has shown the importance of securing the requisites for holding and managing resources as a community (White and Meadows 1981). When common property is treated as an alienable free good, right-holders, freed of the protection and restraint of local institutions defining rights and obligations, will enclose and privatize that property before others do. Common property is not in itself subject to the prisoner's dilemma, nor to an inevitable tragedy of mismanagement and degradation.

The pastoralist dilemma occurs not when rangeland is controlled by communities but when community control is undermined, by state or local interests, such that it can no longer be used to monitor, sanction or exclude. When faced with land grabbing which threatens the integrity of the entire community domain, the individual pastoralist has no choice but to accede to a generalized enclosure of range resources. But the disruption of transformations in land tenure affects the economic well-being of the community and the stability of the food system. However, this scenario is far from inevitable and far from desirable, as it undermines what may be the most appropriate means for managing widely dispersed resources that virtually require high degrees of mobility to sustain desirable levels of productivity (Swallow 1989). The potential should not be ignored that communities can offer the framework within which local goals, conceptualized as "development," can be realized (Berks 1989).

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Ethnobotany at the Interface Between Human Subsistence and the Environment in Africa

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Abstract *Wild and indigenous cultivated plant resources have been essential to the well-being of subsistence communities in Africa for millennia and continue to be so. As well as satisfying human subsistence needs, plants are integral parts of the natural environment. As the study of human interactions with plants, therefore, ethnobotany has an excellent vantage point on the apparently antithetical goals of fulfilling needs on the one hand and of conserving the environment on the other. This paper provides an overview of the roles of plants in traditional subsistence situations. Also, ethnobotany is examined as a discipline that is changing in response to its new relevance as a mediator between human needs and the environment. Finally, issues surrounding the scientific study of plant use in relation to problems related to community resource use are considered, and an African model of participatory-oriented research in ethnobotany is presented.*

Resources obtained from natural vegetation have met human needs in the past, and humans have developed biological and cultural modes of adaptation using plants. Current changes, however, in traditional systems are potentially disruptive to the well-being of indigenous communities and to the environment. Peoples engaged in traditional subsistence lifestyles are being challenged by tremendous forces to embrace the modern world on its terms. Still, indigenous knowledge and specific resources, including plants, can be utilized in a sustainable way to meet the actual nutrition, health, economic, and social needs of communities. International recognition of these general principles has been reinforced through several vehicles including the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro and the International Year of Indigenous Peoples.

Similarly, the World Declaration on Nutrition from the International Conference on Nutrition (ICN) sponsored by the World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO) presents a global challenge to address the food security and nutritional needs of the most vulnerable of the people of the world while maintaining the integrity of the environment for future generations. Specifically mentioned among those populations nutritionally most at risk are indigenous peoples. These are groups whose traditional food systems embody intimate knowledge of the environment and whose future social, economic, and nutritional well-being rest on the integrity of their culturally mediated relationships with the environments in which they live (Johns et al. n.d.a). In turn, indigenous peoples are widely recognized as the best stewards of some of the most sensitive environments in the world.

Plants can satisfy human subsistence needs, and plants are integral parts of the natural environment. As the study of human interactions with plants, therefore, ethnobotany has an excellent vantage point on the apparently antithetical goals of fulfilling needs on the one hand and of conserving the environment on the other. A classical ethnobotanical consideration of the roles of plants in traditional subsistence situations is the first focus of this paper. Also, the paper examines ethnobotany as a discipline that is changing in response to its new relevance as a

mediator between human needs and the environment. Finally, it looks at issues surrounding the scientific study of plant use in relation to problems related to community resource use, and presents an African case as an example of development-oriented research in ethnobotany.

Uses of Plants in Traditional Subsistence Societies

Plants are a fundamental component of human subsistence. Indeed, all of our food is derived directly from plants or indirectly through the food chain, and our relationships with plants has an evolutionary dimension (Johns 1990). Although modern agriculture and the food supply of industrial societies is based on a handful of plant species, traditional agriculturalists, pastoralists, and gatherer/hunters in Africa and elsewhere use a myriad of plants for food, medicine, construction, income generation, *etc.*

Indigenous crops

Indigenous crops are major sources of food for many Africans. Species such as *Eleusine coracana* (finger millet), *Eragrostis tef* (teff), *Dioscorea dumetorum* (African bitter yam), and *Gynandropsis gynandra* are locally important but less common outside of Africa. By propagating these plants as well as landraces of crops of global importance, such as sorghum, African subsistence farmers maintain a wealth of cultivated biodiversity.

Indigenous species and landraces are grown for cultural and biological reasons. They represent continuity with the past and have important places in local cuisines. In addition, they offer particular adaptive features. Although they may not be as high yielding as crops of global importance, they can provide stable production under adverse ecological conditions such as high aridity. Alternatively, they may be harvestable during seasons when other foods are scarce. Although the nutrient composition of most indigenous crops has not been analyzed, these species may be rich sources of vitamins, minerals or amino acids (FAO 1988) that complement other components of the diet.

Finger millet, for example, suffers from relatively few diseases and pests, is tolerant to soil-moisture stress and has excellent storage qualities (Barbeau and Hilu 1993). As well, it has a growth cycle of only 3 months and thus can provide two harvests a year. Finger millet is a good nutrient source with relatively high calcium content, although the availability of calcium is probably somewhat less. Indigenous leafy vegetables are particulary valuable sources of provitamin A, vitamin C, folate, iron, and protein and thus provide a complement to diets high in carbohydrate. As well, they grow quickly at the onset of the rainy season and even with small-scale irrigation can be made available for household consumption or sale.

Wild Food Plants

Traditional African tribes typically use dozens of wild plants as sources of edible fruit, leaves, roots and tubers, barks, flowers, and gums. Some of these plant parts may be chewed, often as sources of water; others are incorporated into the diet like any other fruit or vegetable.

Foraging, particulary for fruits and roots that are edible raw, has been noted as making an important contribution to the diets of children as well as adults. Wild leaves make a valuable contribution in many areas. For example, Huss-Ashmore and Curry (1991) reported from Swaziland that wild greens make up to 74% of all vegetables eaten in rural areas. Representative of the literature on African wild food plants are the following: Scudder (1971), Tallantire and Goode (1975), Woolfe et al. (1977), Grivetti (1978), Fleuret (1979 a,b), Ogle and Grivetti (1985 b), Campbell (1987), and Johns and Kokwaro (1991).

Humans draw on wild foods as regular components of the diet as well as in times of seasonal shortage or of famine. So-called emergency or famine foods are discussed specifically in a number of reports (Brooke 1967; Hunter 1967; Turton 1977; Ogle and Grivetti 1985a; Zinyama et al. 1990).

Herbal Medicine in Food Systems

The use of plants as medicine is a ubiquitous part of the human heritage that has its evolutionary antecedents in the dietary behaviours of our ancestors (Johns 1990). Plants used as food or medicine are often not clearly distinguishable. The wealth of traditional knowledge on medicinal properties of plants is manifest in the numerous papers reporting previously unrecorded data that are published every year in journals such as *Economic Botany* and the *Journal of Ethnopharmacology*. At the moment, interest in herbal medicine as a source of new pharmaceuticals is on the upswing. At least one company, Shaman Pharmaceuticals based in California, has been established (in 1989) with the sole purpose of developing marketable drugs from medicinal plants.

Consistent with their important role in the primary health care systems of the overwhelming majority of people in developing countries (Farnsworth et al. 1985), herbal remedies are generally effective against respiratory, nervous, gastrointestinal, and dermatological ailments (Johns 1990). Efficacy against other conditions can often be substantiated with a little more effort. That many forms of medical treatment, in industrial or traditional societies, have a psychosocial component does not diminish the importance of plants used for conditions without an obvious organic cause.

Notwithstanding the direct action of herbal medicines against infectious agents or in acting on the nervous system, the effects of many medicinal and food plants on human health may be more subtle. Consequently, for traditional peoples, changes in the patterns of use of plants may be unpredictable and disruptive to their well-being. For example, plants ingested in relatively small amounts as food, condiments, or medicine may provide micronutrients, such as iron and β-carotene (provitamin A). Plants that are eaten or consumed as herbal teas may contain nonnutrient constituents that are prophylactic in suppressing infectious agents or in preventing other conditions; however, most such effects are not well studied.

An increased incidence of chronic diseases, such as diabetes, is experienced by many indigenous people as they adopt Western diets and lifestyles. Increased caloric intake, obesity, and reduced physical activity are factors in the etiology of noninsulin-dependent diabetes mellitus (type II) (Diamond 1992). Plant foods in traditional diets are higher in fibre than Western diets and the carbohydrates they contain are digested more slowly (Thorburn et al. 1987). Also involved in the development of diabetes may be the elimination from ingestion of constituents that have protective effects (cf. Swantson-Flatt et al. 1991).

In our studies of plant use among the Maasai and Batemi in Ngorongoro District, Tanzania, we are attempting to address the role of hypocholestremic agents in the diet. The low incidence of atherosclerotic disease among the Maasai has been extensively studied (McGill 1979). We realized during the course of the field study that the Maasai and Batemi consume roots and bark as regular ingredients of milk- and meat-based soups to a greater extent than is generally recognized. This stimulated us to examine the contribution that hypocholestremic agents, such as phenolics and saponins, in these additives make to Maasai physiology. This contribution may parallel that of antioxidant phenolics to which have been attributed the hypocholestremic effects of "Mediterranean" diets (James et al. 1989). For the Maasai, a diet without the roots and tree bark that are taken from local forests and added to the high-fat staples of pastoralism (milk, meat, and blood) could be maladaptive.

In relation to the complex homeostatic nature of traditional human ecology, the continued availability of plant resources is fundamental to the integrity of traditional systems that meet human health and nutritional needs. Threats to traditional food systems come in various forms including ecological, economic, and cultural; ethnobotany needs to be undertaken in this multiple context. Control over land and the resources on it is fundamental to the well-being of indigenous groups.

For people with strong relationships with the land, the loss of their traditional subsistence systems threatens their identity as individuals and the integrity of their sociocultural units. Social breakdown in itself contributes to impoverishment and malnutrition. Even where the resource base appears to be intact, contamination from industrial and agriculture chemicals that permeate through air and water is posing an increasing threat to many traditional food systems. Ethnobotany that is oriented toward addressing real problems of people should be concerned both with understanding traditional human ecology and with the realities imposed by forces in the modern world.

Ethnobotany in a New Era

The recognition of ethnobotany as a scientific endeavour has grown with the concern in academic and political circles for issues related to sustainable resource use. Inquiries producing data on the value and properties of plants are a potential mediating force between humans bettering themselves through the exploitation of natural resources and the necessity to conserve the environments where these resources are found. Ethnobotany has responded to these concerns and is being redefined in the process.

Ethnobotany is an interdisciplinary science engaged in by botanists, anthropologists, geographers, nutritionists, and others. The modern study of useful plants emerged out of the efforts to explore for and develop new products that was part of the period of European colonialism. The golden age of ethnobotany more or less coincided with the coining of the term by Harshberger in 1895 (Ford 1978). Through most of the 20th century, ethnobotany has been at the margins of mainstream science, often dismissed as somewhat quaint, as being largely descriptive and, therefore, essentially unscientific.

With the emergence of a global agenda that focuses on both environmental issues and indigenous peoples, ethnobotany and ethnobotanists have found themselves uncustomarily close to centre stage. Ethnobotany has gained this new prominence in large part because it is by definition concerned with what is the focal point of the sustainability issue, that is the use of a resource(s). Its primary subject material was indigenous knowledge before such terminology was in vogue.

Although it is seldom at the forefront of the disciplines of anthropology or of botany, ethnobotany focuses simultaneously on both humans and the biological world, again matters at the crux of the sustainability issue. Neither has ethnobotany been straightjacketed by theoretical debates when it comes to addressing pragmatic issues on the ground. The field is not without its thoughtful theoreticians but, because it deals with human economic activity and involves direct interactions with people, ethnobotanists slide easily into an applied mode. As an intrinsically interdisciplinary science, ethnobotany embraces concerns for the environment, health, nutrition, culture, economics, *etc.,* and is inherently qualified to participate in the sometimes difficult dialogue between social and natural scientists.

An enhanced profile has affected ethnobotany in various ways. Within North America, one of the obvious signs of change is the explosion of students interested in graduate studies in ethnobotany. As well, the new legitimacy that ethnobotany enjoys means that its research links with other scientific disciplines are enhanced. As it moves away from the scientific margins, however, the field is being challenged to develop new research methodologies. Myself (Johns et al. 1990; Johns et al. n.d.b) and others (Phillips and Gentry 1993) have spoken strongly for hypothesis-driven approaches with more quantitative methods of data collection. Certainly, it is important not to impede the field by imposed orthodoxy, but it is a sign of a new vitality that these new debates are a regular part of ethnobotanical discourse.

On the international front, many scientists in developing countries who have been involved in ethnobotanical work for years are gaining recognition for the first time. In reality, the relevance of ethnobotany to the situations of many developing populations means that for several years in countries such as China, India, and Mexico ethnobiology has been more dynamic than in North America or Europe; this leadership has rarely been acknowledged. Through formation of organizations such as the International Society of Ethnobiology, international ethnobotanists and their colleagues in developed countries are coming together with a more coordinated focus. Interest in ethnobotany by organizations such as the United Nations Educational, Scientific and Cultural Organization (UNESCO) and by major conservation groups, such as the Worldwide Fund for Nature (WWF International) or Conservation International, has further served to coordinate international activities. Through the efforts of UNESCO and WWF, attempts are being made to standardize ethnobotanical methodology.

Little by little, this increased attention is translating into increased funding for ethnobotanical work whether it be theoretical or applied toward community development. In face of the absolute essentiality of natural vegetation for the sustained use of traditional food systems, however, the financial resources directed to documenting and studying the interactions of humans and their plant environment are still very small.

Ethnobotany is on the verge of its second golden age. The guiding force of this ascendence will not, however, be the new therapeutic agents, insecticides, or rainforest products

that are often publicly proclaimed to make study of indigenous knowledge in threatened environments vital to the global future. Valuable products may or may not be an outcome of renewed ethnobotanical activity. It is by embracing a mediator position between human needs and environmental issues that this new stature will be attained. The full potential of this field, however, can only be realized as ethnobotanists fulfil this role in direct collaboration with the indigenous peoples from whom they have classically gathered information on plant use.

In reality, few studies in participatory ethnobotanical research have been undertaken. The Institute of Economic Botany, New York Botanical Gardens and the Járdin Botánico at the Universidad Nacional Autónoma de México are taking a leadership role in this regard. Programs that have incorporate ethnobotany into community development activities in Africa include the SSE Research Program, Mali-Norway (Hveem and Berge 1992) and work in Central Africa of "Anthropologie Alimentaire Differentielle" based at CNRS, France (Hladik et al. 1990). There is not a well-developed consensus of what participatory ethnobotany looks like in practice, and efforts to proceed in this direction are largely heuristic. In the following I present a model that has a theoretical basis and has been refined relative to a real situation in Ngorongoro District, Tanzania. We have begun testing the model in the field in Tanzania.

Model of Participatory Ethnobotanical Research

As part of the process of mediating change in the use of traditional resources, we are undertaking a model project that looks at indigenous knowledge of ethnobotanical resources in relation to nutritional and health needs on one hand and to environmental conservation on the other. This is a participatory project based on a partnership between the Korongoro Integrated Peoples Oriented to Conservation (KIPOC), a locally based nongovernmental organization (NGO) in Tanzania, and the Centre for Nutrition and the Environment of Indigenous Peoples (CINE) at McGill University.

Also collaborating in the project are the Institute of Traditional Medicine, University of Dar es Salaam, the Tanzania Food and Nutrition Centre, and the local Wasso Hospital. KIPOC seeks to involve pastoral peoples themselves in the planning and the actual implementation of development activities in a way that is compatible with indigenous values and with sustained control over their own future. CINE is a permanent and independent research and education resource for indigenous peoples. In concert with indigenous peoples, CINE undertakes community-based research and education related to traditional food systems and nutritional well-being. The empirical knowledge of the environment inherent in indigenous societies is incorporated into all its efforts.

Loliondo and Sale Divisions of Ngorongoro District, Tanzania, are made up of economically poor communities of traditional pastoralists and agropastoralists. Although they have been self-sufficient in the past, their ability to meet their own needs is affected by outside factors and rapidly changing circumstances. One of the characteristics of these communities is their proximity to Serengeti National Park and the Ngorongoro Conservation Area. Environmental issues are particularly relevant in this situation and demand that the communities find ways to adapt that are acceptable to wildlife management and biodiversity conservation. Thus extra stress is put on the people to meet their nutrition and health needs. Nonetheless, it is a fundamental principle of the

project that the conservation of the environment is essential to the community meeting its basic needs; at the same time, unless the basic needs and aspirations of the people are satisfied the environment cannot be conserved.

As currently conceived, the project involves six active components with specific anticipated outcomes. The activities currently under way or being planned are the following:

- An ethnobotanical survey and documentation of indigenous plant knowledge concerning food and medicinal uses of plants as well as utility and firewood uses. To date, we have completed this survey in one of four target communities. The initial work has taken place among the Batemi, a group of 11,000 Bantu speakers (Johns et al. n.d.b). Ethnobotanical work among the Maasai of the district has only recently begun, although we have compiled an extensive computerized database from the literature.

- The evaluation of plants through literature survey on nutrient, toxicological, and pharmacological properties and the undertaking of laboratory analysis where appropriate. Although this activity has not begun in a systematic way we are engaged in an ancillary study on the hypocholestremic properties of the plants the Batemi add to food (Johns et al. n.d.c).

- The nutritional and health assessment of local communities and the establishment of their needs. Social and economic needs of the communities are also relevant.

- The assessment of the distribution and abundance and the ecological evaluation of economic plant species. Quantitative assessments of the extent of plant use are an important activity. We have completed one study in plant ecology and vegetation mapping in the Batemi area (Smith 1993) and another on the propagation potential of wild tuber-bearing food plants used by the Maasai is being planned.

- Curriculum development of ethnobotanical and environmental materials for use in schools. KIPOC is involved in the establishment of the Emamyata Secondary School, situated at Ololosokwan on the eastern fringes of Serengeti National Park. This school seeks to give pastoralists' children access to secondary-level education in a context of community development and empowerment and strives to build on traditional pastoralist knowledge of their environment.

- Community participation and education.

Through these activities, several outcomes are envisaged. (In Fig. 1, planned activities (in italics) are being carried out to produce anticipated outcomes (uppercase letters) relevant to the priorities of pastoral and agro- pastoral communities in Ngorongoro District, Tanzania.) First, the matching of resources with needs can lead to appropriate use of plants to improve community nutrition and health status. Information on the amount of exploitation, the abundance of resources and their exploitability will contribute to a land-use management plan designed to lead to sustainable exploitation of resources to satisfy community needs. Participatory involvement of the community and formal efforts can contribute to the education of the community with direct implications for achieving positive outcomes related to health and nutrition and to the environment. Finally, the establishment of traditional land use patterns through documentation of indigenous knowledge supports the ongoing tenure of the Maasai and Batemi people on their land in face of encroachment from agriculture and other forces.

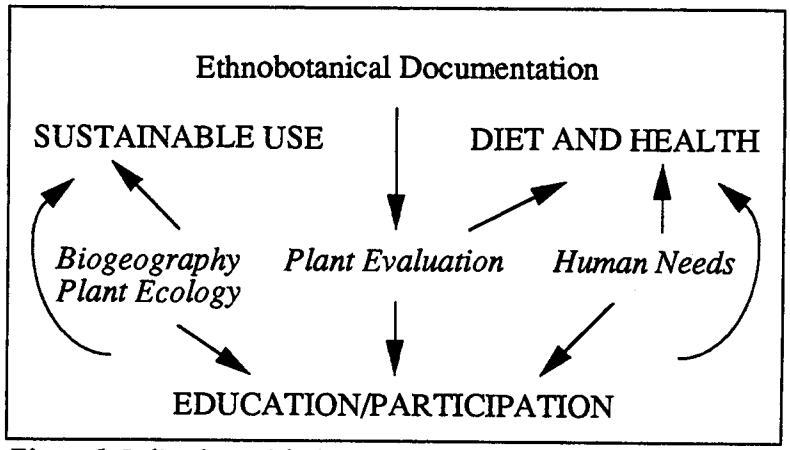

Figure 1. *Loliondo model of participatory ethnobotany.*

Ethnobotany in Relation to Community Development

Participatory models of ethnobotanical research are more concepts than reality. There are too few cases to attest to the validity of this approach to resource management and new methodologies need to be developed. As part of this process, the validation of community-directed ethnobotanical research as an authentic path to constructive outcomes will need to be more clearly established.

In the past, ethnobotanical studies have not been designed first and foremost to bring benefit to the communities where they are undertaken. Historically, they have been primarily exploitative even if not intended to be so. The adoption of a participatory paradigm requires considerable reorientation on the part of ethnobotanists. This process has inevitable hurdles.

A few starting principles in this process of reorientation can be articulated. The new ethnobotany must be carried out not on but with indigenous peoples. For ethnobotanical research to benefit local communities in a way that will lead to positive outcomes, the participation of these communities in the initiation and planning of research is essential. Research needs to be carried out with and by members of these communities and be directed to providing outcomes related to improvement of human welfare in relation to environmental conservation.

Part of this process is the validation of indigenous knowledge. Documentation of indigenous knowledge preserves this heritage for the benefit of future members of a community. Recognition of indigenous knowledge not only gives it value that helps ensure its preservation, but also gives self-esteem to communities whose empirical wisdom has been too casually dismissed by outsiders.

Positive change involves retaining that which is essential and valuable in traditional practices and adopting that which is culturally, biologically, and economically appropriate. As efforts are made to understand indigenous knowledge and scientific knowledge simultaneously and to give them equal value, the forces of change affecting traditional communities can be mediated. In this cross-cultural process, continual education and informal and formal efforts to ensure cross-cultural communication and mutual education should be pursued. Scientists need to understand the cultural values of the indigenous groups they work with and indigenous peoples need to acknowledge the basics of modern scientific methodologies.

As efforts proceed in the development of community-oriented resource studies, various difficult issues are already arising. Central to current debates affecting ethnobotanical work are ethical issues as they relate to the collection, recording, and use of indigenous knowledge. Ethnobotanical research is hampered by differences between the interests of researchers and their subjects, between local and national interests within developing countries, between the interests of developing and developed countries, and between impoverished communities desirous of assistance and profit-oriented companies interested in developing new products. Intellectual property rights coupled with compensation agreements are receiving increasing attention by those engaged in ethnobiology, ethnopharmacology, conservation, development, and politics; a consensus on these issues is important for North–South relationships as well as to further the relationships between indigenous peoples and others.

Ethnobotany offers potential solutions to the conflicts between human needs and conservation of environmental integrity as they occur on the ground; this is the level that solutions must be found. Whether ethnobotanists develop programs that succeed in practice will depend on their coming to terms with the difficult ethical issues. Ethnobotanists are motivated to do so, not just by the excitement of being involved in something vital but because, ironically, in the new global political order they can no longer do their kind of research without engaging indigenous peoples as colleagues and collaborators.

Wild and indigenous cultivated plant resources have been essential to the well-being of subsistence communities in Africa for millennia and continue to be so. Unless the fundamental relationships of humans and their environment that involve the empirical uses of these resources are recognized, programs that promote change are likely to destroy as much or more of the subsistence base than they enhance.

Plants are essential to human subsistence as they are essential to the integrity of terrestrial environments. Ethnobotany as a area of research is strategically placed to provide an understanding of the dynamic relationship among humans, plants, and the environment. A new ethnobotany with a community focus has great application to development efforts that are concerned about both local and the global ecology.

If indigenous cultures are indeed the repositories of empirical wisdom that has enabled generations to meet their needs in an environment, scientific documentation, verification, and understanding, along with education on traditional foods, are key actions for making this wisdom available in the future. More indigenous people need assistance and training in modern technology to transform the knowledge that is their heritage into a form that has the potential to address the inevitable changes that the modern world of technology imposes.

On the one hand, indigenous peoples are being challenged by tremendous forces to embrace the modern world on its terms. On the other hand, for indigenous peoples to adapt in a timely and coherent way, and for the industrial world to hear the wisdom that they offer all humanity, indigenous systems need to be understood simultaneously on their own terms and in Western scientific terms. We believe that the implications of this rapprochement of the ancient and the modern for the future of humanity on this planet are profound.

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The 1992 Famine in Malawi: Why History Matters

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Abstract *Food insecurity has long been a problem for peasant societies in Malawi. Throughout precolonial, colonial, and postcolonial times, rural populations have had difficulties meeting their food needs. This paper agrees with previous works in that the colonial era was pivotal in shaping Africa's past and current economic problems and food crises. It suggests, however, that hunger has resulted more from internal than external forces. Hardly being all-powerful and omnipotent, the colonial state and capitalists lacked the economic basis and political power to create a capitalist mode of production and solve the problem of food insecurity. The majority of the region's inhabitants thwarted colonial plans and did not want to be "developed" in the sense of becoming wage-labourers on estates. By the 1930s officials came to accept peasant production as a viable development strategy. This shift away from estate agriculture toward smallholder production may have represented a political victory for the populace at large, but it was self-defeating in the long term. By independence in 1964, colonial rule had left an economy that was neither capitalist nor precapitalist but contained elements of both worlds. The postcolonial state, therefore, was left with the task of transforming peasants into wage-labourers. Like their colonial predecessors, however, Malawian administrators were unable to effect a complete transformation in this area. With a large percentage of Malawians continuing to eke out impoverished existences as peasants in 1992, famine was inevitable in the face of intensive drought.*

In the last two decades, a plethora of works have explored the causes, consequences, and possible remedies of famine in Africa. Some authors, influenced by dependency theory (Blomstrom and Hettne 1984) have explained past and current famines as the result of colonialism and the extraction of wealth from Africa by foreign capitalists (Warnock 1987). Many of these same authors have offered policy suggestions that involve a retreat from the global economy and a revival of precolonial forms of social organization and production.

The emphasis of policymakers, they suggest, should be on "reconstructing" African communities, because traditional societies had achieved a state of food security before the arrival of Europeans and the external introduction of markets (Rau 1991). Julius Nyerere's policy of Ujamaa socialism was but one manifestation of this school of thought, which was put into practice in the wake of African independence in the 1960s (Nyerere 1968).

The following account challenges the foregoing interpretation. Tracing the origins of the 1992 famine in Malawi, it is shown that food insecurity has long been a problem for peasant societies. Throughout precolonial, colonial, and postcolonial times, rural populations have had difficulties meeting their food needs. This paper agrees that the colonial era was pivotal in shaping Africa's past and current economy and food problems, but suggests that hunger has resulted more from internal than external forces. Indeed, hardly being all-powerful and omnipotent, the colonial state and capitalists lacked the economic basis and political power to create a capitalist mode of production and thus solve the problem of food insecurity. Simply put, the majority of Nyasaland's (as Malawi was known in colonial times) inhabitants resisted colonial plans and did not want to be "developed" in the sense of becoming wage-labourers on estates.

The colonial state's weakness was turned into a virtue by the 1930s, when officials came to accept peasant production as a viable development strategy. This shift away from estate agriculture toward smallholder production may have represented a political victory for the populace at large, but it was self-defeating in the long term. By the time of independence in 1964, colonial rule had left an economy that was neither capitalist nor precapitalist but contained elements of both worlds. The postcolonial state, therefore, was left with the task of transforming large numbers of peasants into wage-labourers. Like their colonial predecessors, however, Malawian administrators were unable to effect a complete transformation in this area. With a large percentage of Malawians continuing to eke out impoverished existences as peasants in 1992, famine was inevitable in the face of intensive drought.

Precolonial Period to circa 1830s

The archaeological and historical record is sketchy, but a few brief comments can be offered on the issue of food production and acquisition in Malawi before the 1830s. What evidence we have suggests that the first inhabitants of the Lake Malawi region were a small pygmoid race of people who practiced a hunting and gathering mode of existence (Pachai 1973, p. 1). The oldest known remains of their settlements, uncovered in the northern district of Karonga, date back to between 50,000 and 100,000 years ago (Clark 1970, pp. 340–411). Known in oral traditions as the Batwa, Kafula, or Akapinji, Malawi's first inhabitants and their way of life were gradually displaced after the 2nd or 3rd century A.D. by the so-called Bantu peoples, many of whom were the area's first agriculturalists, pastoralists, and workers of iron (Mgomezulu 1978–79, pp. 9–12, 1981, pp. 450–451). It appears that Bantu dominance and the widespread use of agriculture and iron tools was complete by the 16th century, although stone age technologies and hunting and gathering continued to be practiced into the early colonial period (Johnston 1897, p. 426; Kalinga 1985, p. 29).

On the question of how effective early precolonial survival techniques were for staving off the effects of hunger and famine, it is only possible to speculate. Nonetheless, it would be wise to refrain from characterizing these societies as living in a state of perpetual bliss where food crises were unknown.

Internecine strife, for example, was no stranger to this period (Rangeley 1963, pp. 39–40), nor were the negative effects such violence had upon food availability and distribution (Gamitto 1960, p. 80). As well, the highest form of food-producing technology was the hoe, an inefficient instrument in comparison to the ox-drawn plow, which did not become available until the colonial period. In Kasungu District the plow did not come into use until the 1950s (Chinthayo Banda 1981–82, p. 15).

Moreover, it is unlikely that the famine relief measures implemented by various Maravi chiefs were a universal phenomenon and at all times effective. (This seems to be Langworthy's implicit contention) (Langworthy 1972, p. 117). Indeed, regional food relief efforts were hampered by a primitive transportation system where roads and river transport were unknown and ill-trodden foot paths and human porterage the norm (Cole-King n.d., p. 76). That early precolonial survival strategies were not infallible can also be gathered by the existence of oral traditions mentioning

a horrific famine that probably occurred sometime in the 17th century (dos Santos 1899, pp. 1–28; Alpers 1969, pp. 21–22; Ransford 1969, p. 17) and large-scale population movements due to drought during the 18th century (Nkhoma 1978, p. 7; Gwereweta Mkandawire n.d., pp. 11–12).

Precolonial Period, circa 1830s–1891

In a separate paper I have argued that the period from c. 1830s to 1891 witnessed a rise in the incidence of hunger and famine because of the creation of a slave mode of production (Nault 1993). This marked shift in the economic history of precolonial Malawi occurred for several reasons.

Of major importance were the migrations of the war-like Yao and Ngoni peoples, who originated from Mozambique and Natal, respectively (Rennie 1965, pp. 302–305; Vaughan 1981, pp. 63–64). At the same time the Yao and Ngoni established themselves by the end of the 1830s, crucial transformations were occurring in the world economy. Following a British naval blockade in West Africa in the early 19th century, slave merchants turned in larger numbers to slave-trading entrepots in Eastern Africa (Jhala 1982, p. 6). Also during the early 19th century, further emphasis on the production of cloves, grain, sugar, gum copal, ivory, and other articles of "legitimate commerce" on the East African coast, and the islands of Mauritius, Reunion, and Zanzibar, created a voracious demand for slave labourers in those areas (Gann 1954, p. 10; Sheriff 1987, p. 2).

After supplies of slaves began diminishing to the east of Lake Malawi and south of the Zambesi River, slave merchants sought out new sources of slave labour inland. By the 1820s and 30s, perhaps only 2,000 or 3,000 slaves were taken out of Malawi, usually through nonviolent means such as trade (Nault 1993, p. 6). It appears, however, that during a period of drought between 1861 and 1863, slave merchants, relying mainly upon the Yao as suppliers, expanded the slave trade into the region at an unprecedented pace (Nault 1993, p. 7–9).

Missionary records indicate that violent slave raids and general warfare at the time of the drought contributed to devastating famines in 1861–62 and 1862–63 (Nault 1993, p. 7–9). One missionary wrote in 1863 that the situation was so desperate that inhabitants were "literally living in the Valley of the Shadow of Death, and the Shire [River] is truly the River of Death" (Rhodes House Library, Oxford, A1(II), Rowley to his brother, 24 January 1863). David Livingstone attributed both famines in the Shire Valley to Portuguese merchants from Mozambique and their African underlings, because "no previous drought ever brought off the entire population" (National Library of Scotland, Edinburgh, Manuscript 20314, Livingstone to Admiral Baldwin Walker, 13 July 1863).

Following the famines of the early 1860s, slavery and hunger became a regular feature of the Lake Malawi region. In 1866 Livingstone expressed great concern that the "process of depopulation" was continuing unabated. He attributed the problem to the "coast Arabs from Kilwa" who would pay cloth and ammunition to the Yao and "say they want slaves." Raiding parties would immediately set off for Nyanja and Mang'anja villages, claimed Livingstone, and "bring back the chief portion of the inhabitants; those who escape usually die of starvation" (Public Records Office,

London, FO84/1265, Livingstone to Clarendon, 20 August 1866). The Ngoni, who at first largely raided for slaves to enlarge their military power and population base of their communities, also began raiding and selling slaves for profit (Oral Tradition: John Lufeyo, Mzimba District, T.A. Mbelwa, 10/6/92; John Mwenefumbo, Karonga District, T.A. Kyungu, 6/6/92; Chief Chulu, Kasungu District, T.A. Chulu, 8/6/92).

It is possible that the numbers of slaves shipped out of Malawi each year between the 1860s and late 1880s was somewhere in the vicinity of 15,000 (Nault 1993, p. 13). On a more human level, the violence associated with the slave trade provoked food crises by forcing victimized tribes to abandon fertile farming land, eke out a meagre existence on wild fruits and roots, and crowd into disease-ridden blockaded settlements. Those unfortunate enough to be captured in raids were forced to march hundreds of miles to slave ports in Tanzania or Mozambique with little, if any, food with the result that hundreds perished en route (Nault 1993, p. 16–26).

Early Colonial Period, 1891–1914

Although British claims to Nyasaland were affirmed with the creation of a protectorate in 1891, the colonial state still faced the daunting task of establishing political control. Nonetheless, Harry Johnston, the country's first Commissioner, proceeded with great zeal, engaging in numerous expeditions to quell the slave trade. Although all of the expeditions against slavers are too numerous to mention, the most important were those against Kawinga (1891, 1895), Mponda (1891, 1894), Zarafi (1892, 1895), Mitoshe (1893), Makanjira (1893, 1895), Matapwiri (1895), Mlozi (1895), Chikusi (1896), and Mwase Kasungu (1896).

If it is possible to criticize colonial intervention as ethically reprehensible, it still must be conceded that the colonial presence from a strictly materialist standpoint was beneficial in this instance. (This was the general consensus not only of colonialists, but also of Malawian informants. Oral Tradition: Frank Wilson Tonde, Chiradzulu District, T.A. Mpama, 14/9/92; Joseph Namathiwa, Nkhota-kota District, T.A. Jere, 11/7/92; I. Nyondo, Chitipa District, T.A. Mwabulambya, 15/6/92.) Indeed, groups such as the Tonga, Mang'anja, Ngonde, Nyanja, and Chewa actively sought out British protection so they could cultivate their gardens without harassment.

As early as two years before the official establishment of colonial rule, the British presence near Zomba had "largely contributed toward averting hunger and famine, which would have inevitably followed had the people not been able to cultivate their gardens" (Public Records Office, London, F084/338, Buchanan to Foreign Office, 23 December 1889). Rather than creating an artificial situation of land shortage, as has often been argued (Mpakati 1973, p. 34), the colonial presence in effect freed up more land for cultivation.

In 1896, following the defeat of Kawinga, large numbers of Africans, formerly harassed by the Yao chief, were observed resettling on the East Bank of the Shire River (Public Records Office, London, FO2/107, Sharpe to Foreign Office, 9 September 1896). Similarly, by 1910, Africans of all tribes were dispersing "wherever they can find suitable land, and...can be found chiefly keeping to the fertile river banks where water and fuel and suitable land for the grain fields exist" (Public Records Office, London, C0525/48, Pearce to Colonial Office, 19 April 1913).

In addition to freeing up more land for cultivation, the political stability provided by the colonial state and an official development strategy emphasizing settler-estate agriculture permitted advancements in the direction of capitalist development. As estate agriculture began the production of coffee, cotton, tea, and tobacco, among other products, a demand for wage labourers arose in all sectors in the economy. Thousands of Lomwe migrated into Nyasaland from Mozambique to escape harsh Portuguese rule, acquire land, and work on European estates (Galligan 1975, pp. 108–123).

With the protectorate lacking lorries, trains, horses, and other forms of transport, employers hired on hundreds of Africans as human carriers to transport local products to areas of export or carry imported products to select destinations (Duff 1903, p. 354). In addition to porterage employment, Africans soon worked in increasing numbers as "carpenters, masons, brickmakers and bricklayers" (Public Records Office, London, F02/746, Handbook on Nyasaland. Enclosure in Sharpe to Foreign Office, 17 January 1903). (Inspired by higher wages outside Nyasaland, thousands of Nyasas, mainly Tonga from the ladeshore, flocked to the mines and estates of Southern Rhodesia and South Africa (McCracken 1977, p. 115).

The mere existence of forms of wage labour in Nyasaland, however, did not indicate that the protectorate had become transformed into a capitalist economy. One of the major impediments to the proletarianization of the work force was the widespread availability of land.

Indeed, planters throughout this period complained of labour shortages, primarily in the wet season, when "natives" were busy cultivating their food plots (Public Records Office, London, F02/746, Sharpe to Foreign Office, 26 January 1903). The first season of acute shortages occurred in 1898–99, but in 1900–01 the situation became so grave that several plantations were forced to cease operations (National Library of Scotland, Edinburgh, Manuscript 7906/171, Alexander Hetherwick, letter to editor of unspecified newspaper, undated).

By 1908, the labour issue had still not been resolved, with the result that one planter complained that "half of the failures in planting have been due to want of labour." He added that "if one-tenth of the able-bodied men of the protectorate would offer themselves for labour during the wet season they would find ready employment and there would be ample work for the remainder during the dry season" (Central African Times, 20 June 1908).

With the colonial state lacking the military might, finances, and moral authority to transform the precapitalist societies it encountered by compelling labour, the economy could not advance into a more mature stage of development. Thus, food crises continued to plague rural communities. In 1900–01, 1902–03, and 1911–12 famines ravaged the Shire Highlands. Megan Vaughan has stated that the 1922 famine was "the first famine in which the government took direct responsibility for distributing relief food" (Vaughan 1981, p. 164).

In actual fact, however, the colonial government had begun implementing such a strategy as early as 1902–03. As part of their relief effort that year, colonial officials transported grain and rice from Kota Kota, Zomba, and Blantyre districts to Chiromo District (259,000 lbs), Chikwawa District (17,462 lbs), Mlanje District (6,598 lbs), and Port Herald District (8,528 lbs). Several hundred families were also supported with wages for working on public works projects such as brickmaking and building construction (Public Records, London, CO525/2, Wheeler to Sharpe, 21

July 1904. Enclosure in Sharpe to Colonial Office, 2 August 1904; FO2/747, Pearce to Foreign Office, 4 May 1903; FO2/748, Pearce to Foreign Office, 30 June 1903).

During the 1911–12 famine, the state enacted a similar program, distributing at least 215 tons of food at cost price to the able-bodied and 65 tons of free issues to the aged, infirm, and children. A public works program saw male workers issued contracts for wood cutting, road building, and transport work (Public Records Office, London,CO525/48, Casson to Acting Government Secretary at Zomba, 10 March 1913. Enclosure in Pearce to Colonial Office, 5 April 1913).

The administration's measures saved many lives, but were not entirely effective. Part of the problem was the country's inadequate communications network, a legacy of the precolonial era. Information of shortages in areas remote from roads would have been slow in reaching the capital at Zomba. Even if administrators were aware of food crises in outlying areas, their main priority was to feed Africans near centres of industry to maintain the few labour supplies they had (Oral Tradition: Yosefe Chindime, Mchinji District, T.A. Mduwa, 3/6/92; Tobias Golden, Chiradzulu District, 19/7/92).

It also must be remembered that due to the limited amount of industry in the protectorate, massive wage labour and tax evasions and the physical and financial expenditures necessary to suppress the slave trade, the administration's revenue base was too low to enable the establishment of an effective famine relief system (Laws 1934, p. 44; Public Records Office, London, F02/212, Captain C. Close, Report on Completion of Nyasa-Tanganyika Frontier, 5 January 1899, British Central African Times, 3 January 1903).

The Great War, 1914–18

The Great War represented a major setback to the material advancements of earlier years. There were many reasons for the overall drop in industrial production and endemic food crises that occurred throughout the war.

To begin, there was the diversion of a large proportion of the protectorate's labour force away from domestic production toward military labour. At least 200,000 men participated in the war as carriers, soldiers, and other workers (Baker 1984, p. 27). Many of these men were decimated by modern weaponry, hunger, and disease (Malawi National Archives, Zomba, 543/1/17/1. Extracts from district annual reports. Notes on South Nyasa District, by Captain J. O'Brian, Resident Upper Shire District, 1924-29). The absence of thousands of able-bodied men from the rural economy was also devastating in the sense that it left the duty of food production to those least able to cope, such as women, the elderly, the infirm, and children (Duff 1932, p. 187). If this were not enough, the men who were working for the military still had to be fed, with the result that the burden once again fell upon those left behind (Nyasaland Times, 10 January 1918).

The worst hit areas during the war were those communities bordering Tanganyika. Not only were they forced to act as food suppliers, but they faced German attacks from across the border and food raids (Duff 1932, pp. 195–196). The most difficult years of the war appear to have been

1917–18, when poor weather and increased military demands for foodstuffs contributed to famine in the Southern Province (Life and Work, no. 2, April–December 1917, Nysaland Times, 10 January 1918). Although the government enacted a famine relief program, its main priority was to defeat Germany; thus, most food supplies were probably destined for its troops in Portuguese Territory (Malawi National Archives, Zomba, S1/83/19, Duff to Colonial Office, 27 February 1991; Sibley 1971, p. 144).

Limited Development, 1918–64

Following the cessation of hostilities in 1918, Nyasaland resumed its pre-War trend of economic growth. Tobacco exports from estates rose from 5,805,396 pounds in 1918 to 11,632,496 pounds by 1928 (Arnold 1935, p. 380). One notable boost to production was the opening up of a tobacco industry based on tenant labour and peasant production in present-day Lilongwe and Dowa districts by A.T. Barron and R.W. Wallace (White 1989, p. 169).

The tea industry also showed signs of impressive growth (mainly in Cholo and Mlanje districts), with land under cultivation rising from 4,000 acres in 1915, to 5,000 acres in 1926, and to 7,000 acres in 1927 (Palmer 1985a, pp. 218–219). Reliable figures for the migrant labour sector are not available, but various estimates affirm high growth rates. (A labour census by the Nyasaland government estimated that in 1928–29 around 20,000 Nyasas were in Southern Rhodesia alone) (Nyasaland Times, 29 January 1929).

The number of Africans in skilled employment in Nyasaland itself hovered around 3,000 by the late 1920s (Nyasaland Times, 29 January 1929). It was actually peasant production — not production through wage labour — that exhibited the highest rates of growth in the post-War era. Peasant cotton production, for example, rose from 392 tons in 1922 to 2,486 tons in 1928 (Pachai 1978, p. 205). Meanwhile, peasant growers sold 1,276,00 pounds of tobacco in 1924 and 7,804,757 pounds in 1927. Some 66,321 peasants were cultivating tobacco alone by 1927 (Arnold 1935, p. 382). As was the case before the war, the economy still did not develop enough to ward off the possibility of major food crises. Indeed, in virtually every year after the war food shortages of minor or major magnitudes occurred throughout the protectorate.

In 1918–19, a dehabilitating influenza epidemic and drought contributed to food deficits (Malawi National Archives, Zomba, S1/83/19, Duff to Colonial Office, 27 February 1919). Following a period of drought in 1922, the protectorate experienced in 1922–23 "the greatest shortage of foodstuffs natives can remember" (Malawi National Archives, M3/1/1, Annual Medical and Sanitary Report, 1922).

Drought and the slow response of the Bowring administration gave rise to famine in Mombera's District in 1924–25. (On the slow response of the Bowring government see Chapter five of Nault (n.d.)). In 1925–26, excessive rains aggravated food shortages in Central and Southern Provinces (Malawai National Archives, Zomba, NSB/2/1/1, Lower Shire District; Annual Report, 1925–26; NSD/2/1/1, Annual Report for the Chiradzulu District for the Year Ending 31st March 1926; NSB/7/1, Annual Report, 1925–26, Neno (Central Shire) District).

Drought was again responsible for food woes in the Southern Province in 1927–28 (Malawi National Archives, Zomba, NSB/7/1/1, Annual Report, Blantyre and Central Shire Districts for the Year 1928), while marauding animals wreaked havoc upon crops in Kota Kota District (Malawi National Archives, Zomba, NN/1/3/6, Resident Nkhota-Kota to Chief Secretary, 30 April 1927).

The main impediment to economic advancement in the postwar period continued not to be the overexploitation of the workforce by capitalists as has often been argued, but their underexploitation. Indeed, estate owners voiced constant dissatisfaction with their inability to mobilize labour supplies on an efficient and regular basis. Of all types of workers, "upcountry" workers laboured the longest, averaging only 6 months of the year.

Tenant labourers, who conventional wisdom has portrayed as the most exploited social group, usually were "very irregular in attendance" and would often take 2 months or more to complete tasks that should have taken only a month. Estate owners complained of similar problems with "local" workers, who, owing to the distractions of home life, did not remain on estates longer than 3 months.

In every instance, planters complained of acute labour shortages at the time Africans were planting or harvesting crops. The ability of workers to retain independent access to land and their own food supply (which was not always possible in the precolonial era, but the general rule under colonialism) paradoxically proved a barrier to capitalist development (Malawi National Archives, Zomba, S1/1113/20, Farquhan to Chief Secretary of State, 15 December 1920).

Fatigued with settler capital's complaints and past attempts to develop Nyasaland along Western lines, officials in the postwar period throughout British Africa became increasingly attracted to the ideas of Frederick Lugard. Rather than advocating shaping Africa in Europe's image, as early administrations had aimed for, Lugard and his supporters now extolled the idea of a "dual mandate" — the preservation of tradition and the encouragement of modernity for the supposed mutual benefit of Europeans and Africans (Lugard 1922).

In practical terms, colonial administrations realized they could save funds and political difficulties by devolving to traditional authorities more administrative powers. Economically, Africans were accepted as peasant farmers, because foreign companies as well as the colonial state could more easily access their surpluses in this manner than through wage labour (Kennedy 1988, p. 17). The Great Depression, as it turned out, would prove pivotal for consolidating propeasant opinion among policymakers.

Although falling commodity prices during the Great Depression have often been implicated for an intensification of food crises in Africa (Shenton 1986, p. 103; Klein and Roberts 1987, p. 23), Nyasaland did not fit this model. The protectorate was indeed not immune to decreasing world market prices for its products, but, because the majority of its inhabitants retained access to their own food supplies, no serious consequences manifested themselves. Throughout the Depression, officials and settlers expressed worry over the food economy but, owing to fairly reliable weather and effective responses by the state, famines anticipated in 1928, 1929, and 1933 did not materialize (Nault n.d., see Chapter six).

The Depression, nonetheless, represented a watershed in Malawi's political and economic history. Following the heavy blow low prices dealt to British colonial prestige, the state washed its hands of the affair by devolving more political authority toward traditional African leaders. For good reason, Tangri has characterized the colonial state's post-Depression administrative policy as representing a "hardening" of the "dogmas of indirect rule" (Tangri 1972, pp. 292–293). Whereas previous Native Associations (made up of teachers, clerks, entrepreneurs, and other potentially progressive classes) had previously maintained some degree of access to the central government, the state now enshrined in its laws that the "chiefs were the premier legitimizing force regarding African administration" (Tangri 1972, pp. 292–293).

The second major consequence of the Depression was the abandonment of the state's initial policy of supporting estate agriculture as an engine of economic development. Thus, officials, such as E.W. Davy, the Director of Agriculture, came to voice the previously heretical position that Nyasaland was "not a country which the European could colonise or make his home" (Nyasaland Times, 9 September 1930). An official named Downey similarly pronounced in 1930 that "it has become clearer every year that Nyasaland is not a country for the European settler" (Public Records Office, London, CO525/137, Minutes by Downey, 27 June 1930).

The results of official ambivalence to estate agriculture were soon all too evident. Between 1928 and 1934 a total of 97 estates were liquidated (Palmer 1985b, FN no. 43). At the same time, the settler population shrank from 229 in 1928 to 82 by 1935 (Chirwa 1992, p. 224). Whereas European estates had accounted for 17% of total cotton production and 57% of total tobacco production in 1927, the corresponding figures for 1933 were 4 and 28%, respectively (Chirwa 1992, p. 231).

The Depression was further a watershed in the sense that the direction of state policy had now completely shifted toward peasant agriculture and the promotion of a bureaucracy to control and appropriate surpluses from this sector of the economy. Throughout Nyasaland and the colonial world officials embarked on a flurry of conservationist projects and irrigation schemes, attempting at the same time to spread modern agricultural techniques among peasant communities (Mandala 1990, pp. 206–207). Official opinion increasingly implicated middlemen as the source of woe for peasants, the end result being a proliferation of parasitical, state-controlled marketing boards (Shenton 1986, p. 107–116). Rather than completing its historic mission to transform Nyasaland into a capitalist economy, the colonial state effectively abrogated this role by seeking support from and bolstering the very forces which kept Malawi out of the modern world. To be sure, botched colonial policy was not enough to prevent a certain level of capitalist development from occurring regardless (Warren 1984; Warren's statistic's indicate the wage labour continued to grow throughout the colonial world after 1945).

Nonetheless, had successive colonial administrations held firm to the state's original vision of large-scale agriculture and export-oriented growth development would have been more pronounced. Notions of a "dual mandate" may have appeared humanitarian and assuaged the liberal conscience but, in reality, the idea that a country could enter the modern world while still practicing ancient customs contributed little to economic advancement. The 1949 famine, so eloquently discussed by Meghan Vaughan (Vaughan 1987), was ample testimony to the self-defeating nature of peasant-oriented production.

Independent Malawi, 1964 to the Present

In the long run, imperialism was indeed a "pioneer of capitalism" (Warren 1984), but in the case of Nyasaland the transformation was left half completed. Independent Malawi was thus left with a host of unresolved problems and new dilemmas. Backward-looking traditional authorities continued to wield influence, constraining policy options. In particular, traditional authorities' reluctance to alter precapitalist forms of land tenure has proven to be an obstacle to progress (Thomas 1975, pp. 30–51). Expanding upon the institutions left by colonial rule, the state tightened its grip over peasant producers. Because it was those who wielded state power who enjoyed the greatest prestige in colonial times, it was not unexpected that educated Malawians would choose the state as a means of accumulation rather than innovate within the postcolonial economy (Pike 1968, pp. 219–220).

Although President Banda demonstrated rare foresight among African leaders and came to favour large-scale agricultural enterprises (Mulwafu 1990, p. 95), the majority of Malawians still continued to work small plots of land with primitive technologies. Initially, the postcolonial state adopted a peasant-oriented development strategy. After 1968, however, Banda cautiously began encouraging large-scale farming and estate agriculture (Mulwafu 1990, p. 108). At the same time, population pressures reduced the fertility of soils inducing the need for expensive fertilizers.[1] Regional famines, although well-hidden from the international media, surfaced periodically (Laslett 1985, pp. 383–406).

The 1992 drought and famine dispelled the widely believed myth of Malawi as an African showcase where famine was nonexistent (Liebenow 1987). For all its talk of "food self-sufficiency" in previous years, Malawi was now forced to empty its foreign currency reserves to purchase foodstuffs from abroad and rely upon international donations. (Several thousand tons of grain were purchased in this manner from Brazil and Canada.)

Sensing an opportunity to undermine the Banda government, opposition groups urged immediate political reform and democratization (Anon. 1992). Western governments, wincing under the effects of the global recession and complacent with the end of the Cold War, were all too glad to link political change to further economic aid packages, seeing how aid could now be withheld for "politically correct" reasons.[2] Not surprisingly, many observers were predicting an economic and

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[1]Smallholders used 1,083 tons of fertilizers in 1960. By 1967 that amount had already risen to 10,834 tons (Liebenow 1987, p. 379). The current population to land problem was not the result of excessive land alienations by colonialists. Rather, it has paradoxically resulted from the longer life span made possible by advancements during the colonial and postcolonial periods (see Chapter two and Chapter five of Nault (n.d.). Malawi's current problems with ecological degradation and high population densities also demonstrate the limits to peasant smallholder production, because high population densities in highly capitalised developed nations (for example, Holland) do not interfere with questions of food supply.

[2]Suspension of Western Aid, Keesing's Record of World Events, 1992, 38898; Refusal of Aid By Norway, Keesing's Record of World Events, 1992, 39039. Norway suspended aid in late August. Following a meeting of the world bank in Paris in May, Western donor nations blocked US$74,000,000 in new aid, pending political reforms.

political disaster ("Threat of Starvation Intensifies Opposition to Government," London Times, 27 May 1992). Nonetheless, if the famine initially gave cause for despair, it eventually gave cause for optimism. Despite wrong turns at different points in Malawi's history, the Banda government's renewed emphasis upon estate agriculture in the postcolonial period meant that Malawi in 1992 was more developed than it had been under colonial rule. For a favourable appraisal of the government's shift toward large-scale agriculture see, Acharya (1982, pp. 109–147) and Livingstone (1985, pp. 169–192).

Unlike poor relations such as Sudan and Somalia, Malawi had experienced nearly three decades of political stability and export-oriented growth that had left her with significant revenues to purchase foodstuffs from abroad. Sufficient external donations of foodstuffs, a nonexistent possibility in colonial times, also flowed in to stave off the crisis.[3] Although the combined relief effort was not without its flaws,[4] capitalist development in both the West and Malawi provided sufficient wealth, appropriate institutions, communications, and expertise to ward off epidemics and mass starvation.

Conclusion

Tracing the background to the 1992 famine in Malawi, this paper has shown that food insecurity has been a problem for peasant societies since precolonial times. This account agrees with previous works that argue that the colonial era was of pivotal importance for shaping the presence circumstances in which food crises occur in Africa. I have argued, however, that the colonial state and capital were limited in power and resources and frequently had to adapt to the wishes of the populace at large.

The colonial state's eventual acceptance of peasant over estate production after the Great Depression thus was largely the result of the peasantry's ability to evade wage labour and retain independent access to land. With the overall wealth within the protectorate consequently remaining low, the country's institutions could never be sufficiently developed to ward off famine. Had the colonial state persevered with its original vision of an estate sector spearheading economic growth, perhaps the colonial legacy would have been less ambivalent. As it turned out, however, independent Malawi was left with the unresolved issue of transforming the peasantry into wage labourers.

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[3]In spite of reduced Western aid for general development, Malawi still received substantial funds for drought relief. At the World Bank's meeting in Paris from 12 to 14 May 1992, Western donors withheld funds for general economic development but pledged $170,000,000 in drought aid (Suspension of Western Aid, Keesing's Record of World Events, 38898. See also UK Gives Further L1 Million in Aid as Drought Continues in South Africa, London Times, 14 March).

[4]When in Malawi, I heard at least of one case of corruption involving government employees during food distribution. Malawi Broadcasting Corporation (MBC) reports also mentioned cases of Malawians posing as Mozambiquan refugees and individuals using false identities to get extra rations.

A complete transformation still remained to be effected by 1992, with the result that drought was able to turn into famine. On an optimistic note, however, capitalism had indeed been developing throughout the postcolonial period in Malawi and the world at large. The proceeds and expertise and establishment of proper institutions from this development ensured that 1992 in Malawi did not witness the great loss of life and dislocation familiar during most African famines.

It would seem, then, that the future elimination of food crises in Malawi will not depend upon reproducing or preserving peasant societies but upon transforming and transcending their mode of existence. Although social strains will continue to manifest themselves, it is imperative that official policies continue to support capital and the growth of wage labour relations. Sentimental portrayals of the African precolonial past and appeals to "African socialism," common in the heady days of the 1960s, today have little relevance for eradicating age-old but solvable social problems such as famine.

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Research Issues in Developing Sustainable Food Economies

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Abstract *Increasing the incomes of poor households is a necessary condition for food security, but will not by itself ensure their food security. One reason lies in the difference between the anticipated value and the actual value of choices individuals or households make to achieve security and social functioning. The difference in values occurs because of the social limits to economic growth in terms of the use of finite resources. Research activities on economic behaviour and food security often document the choices that individuals or households make on resource use, followed by interpretations from professionally and discipline-oriented viewpoints. The reasons for choices made by individuals or households are not usually recorded and leave gaps in the understanding, as well as prediction, of behaviours. It is proposed that emphasis be placed on describing the reasons for choices on resource use at the household and individual level in planning interventions and formulating policy.*

An often repeated myth about development and access to food holds that increasing the incomes of poor households will ensure their food security, as it is expected to create more choices for the individual members to fulfil their needs. The myth itself, and the justification for it, are supported by two observations.

One observation is that in communities where a middle-income group is created, large enough to make public investments in social and health services that are accessible to the majority, health problems and living standards normally associated with poor groups in the community are reduced. The second observation is that poor households use additional income to increase expenditures on food, thereby increasing access of its members to both more and more varied nutrients. Hence the conclusion that any success in increasing incomes will improve access to food, food security, and nutritional status.

Using the label "myth" for a logical idea, which seems to be supported by changes we can all identify with, would then seem to be misleading. The term is chosen, however, because at the micro-, or individual-experience level, increasing income does not have the suggested consistent result of increasing nutritional status. In fact, many studies can be quoted where increased wealth measured by aggregate income had no practical relationship with nutritional status. As many studies show positive effects as there are studies showing negative effects of income increases on nutritional status.

I start this paper with these contradictory views because discussions to reconcile them capture several important aspects of sustainable development related to the behaviour of people. I will not deal specifically with the producer's point of view in achieving sustainable development but, instead, focus on some research agenda points that come out of consideration of the consumer's point of view. For this reason the paper deals with the social aspects of environmental management, rather than choosing optimal production systems.

I also use estimates of food access and nutritional health as central elements in the discussion for two reasons. First, because such estimates reflect the variety of choices that people

in different economic and social environments make. Second, because these estimates are part of assessments of health status, which form part of quality-of-life assessments.

Economic Growth and Resources

If problems of development can be solved by raising the incomes of individuals, especially in developing countries, then considerable economic growth needs to take place. The growth is needed to meet the needs of an increasing population, as well as provide for increases in individual incomes. The high rates of growth are themselves causes of environmental problems, especially in ecologically vulnerable areas, such as semi-deserts, fragile highlands and coastal areas. Growth in such areas will probably rely on resources from elsewhere to sustain growth. Government policy will determine the extent that additional resources are channelled to such areas.

It seems that sustainable growth in vulnerable areas that avoids degradation to the environment beyond short-term, independent recovery would need among others, three of the following conditions:

- Investments from the larger, national community,
- Reduction in population pressure, and
- Increased efficiency in the use of local resources.

Some combination of these three policy areas will need to be implemented to optimize the effects of growth and maintain a functioning physical environment. I will not deal with the appropriateness or otherwise of various government policies that channel investments to vulnerable areas. The economic analysis of such policies has been well described in the context of high growth and the relative market efficiency in areas with foreign exchange earners. Neither do I want to deal with policies aimed at reducing population increases, which have also been discussed fully in many fora.

Instead, I want to focus on the suggestion that the environmental resources in such areas can be used more efficiently at the microlevel. Efficiency is used here as the lowest use of resources to achieve the benefit required to meet basic needs. It is assumed that higher benefits to the individual to meet basic needs will reduce the frequency and amount of resources used.

Social Limits to Growth

The choices that individuals make to meet needs depend on their perceptions of risk, or cost, and benefit for each investment. Such perceptions in turn depend on the consumption behaviour of others, not only the consumer making the decision. For example, an individual who spends time and money to obtain more education will expect specific benefits, such as access in acquiring higher paying jobs or higher status with attendant advantages. If a large number of people make the same investment, competition for the higher paying jobs increases and benefits

of the educational investment to the original consumer are reduced. Hence the value of the benefit relates to the consumption behaviour of others, not only the behaviour of the consumer.

If everyone stands on tiptoe no one can see better. The consumption by others affects the value of the product you purchase as an individual. Public goods, such as road transport, which must be shared and where new users can not be denied, would be affected. Space can be increased only at a much slower rate than the increase in users. The resulting pressure diminishes the quality of the resource (moving quickly on smooth surfaces), because the heavy use makes the surfaces deteriorate and causes additional wear on vehicles, as well as the traffic jams lowering the value of fast transport. Scarcity forces both price inflation, through regulatory fees and more vehicle repair, and a reduction in quality of the good for all concerned, where longer journeys are needed for the same meetings or purposes or both.

This effect is relevant to discussion of environmental sustainability because the resources under consideration are scarce in relation to the demand, and yet they have to remain available at a minimum level to all. Hence the value of scarce resources necessary to meet basic needs will, therefore, be perceived differently by consumers and economic planners.

The benefits individuals perceive to derive from their "investment" decisions are not usually included in predictions of economic behaviour. Yet a description of such benefits may well explain why macroeconomic observations are different from the microexperiences. For example, rural to urban migration may be explained by higher incomes in urban areas and the migration requires more urban investments. Yet, even with additional investment, the experience of only a few individuals includes consistently better incomes as resources are insufficient to meet needs. It seems irrational for people to work very hard to achieve a very low standard of living. The situation may be maintained because people derive security from access to a greater number of income sources in urban compared to rural areas. This may explain why resource use that is unsustainable for the community is maintained by individuals. At the same time, social limits to growth force a separation between the choice of the individual and the experience of the individual, which, in this case, leads to poor health and low productivity.

Food Security and Economic Stress

The effect of social limits to economic growth is to heighten the competition for scarce resources and devalue the resource at the same time. Food is one of these resources, where scarcity will drive up the price, while limited access and variety reduces the social value of the food. Food is used in two ways by all economic classes. First, it is used for physiological reasons, such as to avoid being hungry. Second, it is used for a variety of nonphysiological or social reasons, such as making food available to others to confirm or maintain a social position in society.

If food is scarce in a household, competition affects both functions, because the needs of family members are not the same and because social needs are met at the same time as physiological needs. Hence distribution of food in the household can be inappropriate for the physiological needs of household members, because other members need to satisfy social needs. For example, a senior member of the household will preserve social bargaining power when high-

status food, such as meat, is served. Where food is scarce, malnutrition may then result among the low-status household members.

There are of course many other causes of clinical malnutrition and the effect of economic competition may not be a determining one in all instances. But the effect may be evident in the use of other resources, such as the time spent in activities to maintain household functions or the effort made in the care of sick household members. Such differences make it unreasonable to assume that simple increases in income will reduce health and nutrition problems.

Perhaps more important are the issues arising from these points:

- One, that the reasons for given expenditures of money, or other exchangeable resources, determine value, in addition to the amount spent. Achieving a higher standard of living is one purpose, while maintaining security of income or social rank are important for longer term food security.

- Two, that the number and range of choices households or individuals use to meet needs depend on the ability to optimize economic "investments," as well as the total resources available. The control over income by the individual is at least as important as the total amount of income available, as shown by many studies on the differences in income by men and women.

- Three, that the value of the investment choice changes with the consumption of others, as is shown in the explanations on the social limits to growth.

Government policy for control over resources should take such aspects into account. Especially in relation to control over the informal economy, which is particularly important for marginal groups and those living in vulnerable areas. Little evidence, however, is available to determine the practical importance of the three issues in policy planning. Nor is there sufficient knowledge in methods or procedures that allow these issues to be integrated into assessments and policies.

Research Concepts

Dynamic Change

The situation for marginal groups is defined by a process of adaptation, where the cultural values that enhance the effect of positive changes in resource use become more pronounced. At the same time, the structure of interactions, within and outside the household, serve to optimize resource access and security of access at the lowest cost. The process is as yet poorly defined in dynamic terms.

The process depends on household members using information about changes and the associated risks. From a research perspective little of this information seems to have been documented, possibly because of assumptions about the behaviour of households or because the type of research methodology was not available.

Social Organization

The question arises as to why some groups are able to adapt successfully and others do not. Even in truly deprived situations some individuals are able to maintain a minimal level of health and social functioning. It may be that the answer can be found in the laws and regulations. Social organization is expressed in the laws and regulations that govern trade, social interactions, and access to resources. Two criteria are required for laws and regulations to function equitably for all urban dwellers:

- Laws need to be enforced for all.
- People need to be able to change laws in response to changing situations.

These requirements may be difficult to achieve. First, because of the inherent resistance to change of the administrative structure that applies the laws. Second, because the political influence of people in marginal groups to change laws and regulations is limited by low economic power and lack of access to transactions in the formal sector. Third, because the population that controls the formal economic sector maintains barriers to access for new producers/consumers because unlimited access would weaken vested interests.

For example, many months or even years are required to obtain licences for business, construction, or access to services. The periods are far longer than the time in which the basic needs of families and individuals change. Hence the systems can not be responsive to needs. In addition, there are frequently prohibitive costs for obtaining approvals. The only way to meet needs, therefore, is to circumvent the system through personal contact, which requires the individual to be part of the system in the first place.

If social organization is as important as several authors suggest, then increased income alone will not necessarily meet the basic needs of people. In that case, nutritional status will not increase with greater purchasing power. Improvement also requires action from within community groups to create environments in which the changes can take place.

Choice Elasticities

The research concepts can include the entitlement theory of Ameyarta Sen. The uses of goods and services in the household, however, may be associated with values not normally captured by market signals, e.g., the value of education to certain subgroups. Individuals take such values into account in trying to improve their quality of life or future security. One assumption is that greater access to resources, whether income or productive capital, will increase the number of choices the individual can make to meet needs. The theoretical relationship is shown in Fig. 1.

Because the vast majority of individuals do not control the market prices, social resources become particularly important in cases of scarcity. This situation differs from that in rural areas where productive resources can supplement the social resources, such as support from the family and services available through either community or government organizations.

This means that meeting basic needs will inherently lead people to a series of choices and activities regarded as economically "irrational" in that they do not optimize the productive resource use by the individual. There is little or no return or earning from some of the investments to meet basic needs.

Choices made by individuals reflect not only basic needs, but also status, security, risk, and sense of community. Most of these concerns can not be predicted using economic behaviour and, therefore, modify "economic" behaviour. In practice, they will influence the economic behaviour by making it less efficient. People do not act rationally in the economic sense.

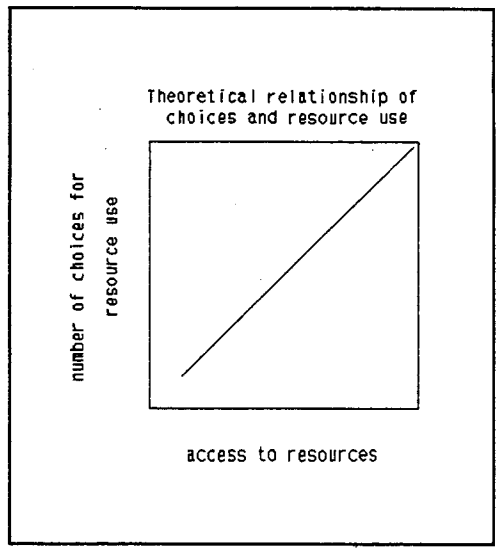

Figure 1. Theoretical relationship.

For example, decision- making in the household on food, housing, energy use, and social obligations determines the status of individual members. What differences in views between husband and wife produce constraints for the use of resources to benefit health status? Or, types of child rearing influence the nutritional status? What reasons motivate breastfeeding choices, interaction time, family diet modifications, health care expenditures? The reasons determine the priority the child has for use of resources and the range of choices left to their use. Do these questions matter? They do matter if environmental policy can regulate access to resources in ways that match priorities perceived by people. Because then policies could be formulated for selective benefit and expect support across social groups.

The central aspect is the choice of resources available to the individual. Hence the idea of choice elasticities to describe the functional importance of choices. Choice Elasticity can be defined as: the incremental benefit to nutritional status from an increased number of choices. Alternatively, perceived benefit can be used, expressed in relation to expected benefit, divided by indicator of number of choices. Choice elasticities capture the value of noncompetitive action, which is important to create conditions to access resources and energy by disadvantaged groups.

Research Topics

Among the many topics for which new information is required to support environmental community action or policy formulation, I will list only a few that arise from the issues described:

- Research is required to ascertain ways of incorporating alternative economic definitions of resources in policy planning. Review of use of "causal models," which incorporate aspects other than pure economic ones, in government departments as well as other agencies. It will be relevant to change economic prediction techniques to include limits to benefits from market participation. In addition, a review of resource definitions used to estimate availability to aggregated or subgroups.

- Research is needed to determine the effect of policies that incorporate the perception of causes by people in marginal areas. Both the process and the effect of establishing priority for investments and interventions in the local environment can be based on recipient views. Situation analysis should be carried out using alternative points of view to complement the views arrived at with professionally based planning only. Mechanisms for the population to express views in the planning, implementation, and evaluation process need to be described. Contributions of people who live in such areas and use the resources may affect the sustainability of interventions.

- One "tool" to assist research initiatives on alternative definitions is estimates of the choices available to, and the choices used by, people in marginal areas to meet basic needs. The range and nature of choices, described in relation to the social environment may be an indicator of economic behaviour that predicts future uptake of resources differently from traditional economic indicators.

Policy and Politics: Tools for Overcoming Food Stress

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Abstract *The paper discusses the political dimension of the policy tools that have a place in combating food stress in Africa. After briefly listing the objectives of food policy, the paper notes the different kinds of tools of food policy and examines the political context and the political implications of their use. It closes with a discussion of how participatory research may be able to change local political space in ways that make it easier to attack the causes of food stress. The main argument is that the choice of tools to alleviate food stress can and should take explicit account of the political dimensions of the tools under consideration. Although the social and political obstacles are great and sometimes overwhelming, properly conceived participatory tools can often help shape local politics to support effective policies rather than to undermine them.*

The purpose of this short paper is to set out some ideas about the political dimension of the policy tools that have a place in combating food stress in Africa. After briefly listing the objectives of food policy, the paper notes the different kinds of tools of food policy and examines the political context and the political implications of their use. It closes with a discussion of how participatory research may be able to change local political space in ways that make it easier to attack the causes of food stress.

The main argument of the paper is that the choice of tools to alleviate food stress can and should take explicit account of the political dimensions of the tools under consideration. Although the social and political obstacles are great and sometimes overwhelming, properly conceived participatory tools can often help shape local politics to support effective policies rather than to undermine them.

The goal of reducing stress on food production and consumption breaks down into a set of more specific policy objectives. The following list recognizes the importance of environmental damage and social inequality in perpetuating food stress:

- Increase local food production;
- Diversify local income sources;
- Monitor and reduce environmental damage;
- Improve the food and security entitlements of those whose basic needs are at risk;
- Improve local social support services, especially for those with greatest needs; and

- Strengthen the voice and capacity of women, especially with respect to the foregoing objectives.

To reach these objectives, nongovernmental organizations (NGOs) that work with the permission and support of governments can combine several different tools in an effort to improve food production and consumption. Tools fall under one of the following headings:

- Shaping market channels and prices;
- Creating, finding, and distributing new technologies;
- Issuing (or removing) commands that require, forbid, or regulate activities;
- Providing services;
- Taking part in dialogue, consultation, and decision with local people (leaders or citizens); and
- Using patronage and clientelism to gain selective compliance.

In places where the food system is stressed, the administrators and the NGO workers who may bring policy initiatives into the locality are usually themselves feeling pressure. They, too, are engaged in a struggle to improve their access to basic consumption goods and services. They may also engage in competition for control of productive resources, such as local farm land. It is quite likely that they will be willing to use their control over public resources to further their access to basic goods.

Policy initiatives encounter people who are already acting on their own account, doing what they can to survive and prosper economically and socially. Because resources for adequate production at existing levels of organization and technology are in short supply, here is bound to be a struggle for access to resources. In addition, some local people, whether or not they engage in food production, search for ways of getting food and other basic goods that do not depend on direct production. They look for ways of earning money with which to purchase food: off-farm work for family members, markets for nonfood agricultural products, and markets for nonagricultural small commodities. They may also look for subsidies or gifts from government, NGOs, family members, or anyone else. Thus, there is also a struggle for entitlements (defined as ways of getting food) other than direct production for use.

The struggles for resources and entitlements are not new to the locality. They have a history that reflects and creates alliances and inequalities. Any new policy initiatives are introduced into an established pattern of power with an established language and established forms of meetings. The existing power structure that incorporates administration and local society can channel and neutralize many policy initiatives. The code of public morality in the region under food stress may have been affected by struggles for resources and entitlements and by experience with the ineffective or self-serving government and NGO personnel. There may be a survival morality that is cynical about the intentions and capacities of outsiders and about any claims of

selfless generosity and that considers self-regarding motives to be the only ones worthy of trust. Social morality may have evolved in other ways but, in any case, the state of public trust should be taken into account.

Altering Markets and Technologies

One of the attractions of policy tools that work through market relations or through the provision of new technology is that they need not directly and overtly confront power relations, or so it seems. Their impact on power emerges only gradually. Changing prices or changing the conditions of pricing (by altering the exchange rate, for example) affects a large number of small, private transactions.

Except for the first step of removing subsidies, the changes usually appear automatic and impersonal. For farming people, however, there is often an additional factor that decreases the amplitude of favourable price changes. Many farmers contract debts to buy food and necessities in the period before crops are sold. For them, the effective price is diminished by an interest charge that is likely to expand to take a share of any price gains. Furthermore, prices for inputs usually rise at least as fast as prices for crops sold. Thus, the real gains in income due to price rises for cash crops are likely to be small and fleeting.

Similarly, introducing more productive seeds and inputs and improving the efficiency of the farming practices of peasant farmers seems to change nothing but the productivity of land and labour. At least that is the claim or the hope. In fact, new technologies always cost something, and they are risky. Those able to pay for them and able to absorb the risk of failure are likely to be the first adopters. If the technology succeeds they get an additional advantage in production that they may be able to use to improve further their access to resources and entitlements, perhaps at the expense of their poorer neighbours.

If one set of farmers is able to accumulate more power and if another set of farmers loses control of productive assets and entitlements, the losses occur only gradually. Both gains and losses appear to be the result of the prescience and hard work or the ignorance and poor work of the producers. The beauty of price and technology as tools of policy is that they seem to flow right through the small openings in the social structure of power to become available to any producer who is willing to perform. The results, however, often show that lack of resources keeps many producers from responding to price increases and new technologies. The real availability of better prices and improved inputs is often compromised by profiteering and incapacity among the intermediaries. The seeds and fertilizer do not arrive in time; interest and transportation charges and sheer cheating eat into the price paid producers for their crops.

It is difficult to inject price incentives and improved technologies into production of food for local consumption. Food crops may not be sold on a large scale, preventing price incentives from operating and yielding no monetary return to cover the cash outlay for improved inputs. Moreover, research on self-provisioning crops lags far behind research on cash crops, particularly export crops. Urban consumers stand as an effective lobby against substantial rises in prices paid for food crops that enter the urban food market.

Even prices and technologies are policy tools that, in the end, become embroiled in local politics. They have an important place as policy tools, but they do not circumvent the need for political engagement between government or NGO workers and members of the local community.

Classic Tool of Government: Issuing Commands

There is a long colonial and postcolonial history of governments implementing rural development by commanding peasant farmers to do certain things (weed early, plant cassava, plant cotton, make ridges, dip cattle) or not to do certain things (burn old vegetation, sow crops in the flood plains of rivers). The trouble with development by command is twofold: it poisons relations between government and producers and it is readily undermined by clientelist payments and arrangements by which commanders and enforcers transform their power to command into private resources. Development by command may have its place, but it is unable to avoid the realities of political relations between developers and developees. It slides easily from command to patronage.

Removing restrictions is really the reciprocal of issuing commands; it is the removal of standing orders. It may free farmers to follow their own preferences and it does remove patronage power from administrators who no longer have a bit of rule enforcement to trade away.

Providing Services

The classic agricultural service is to provide information. The purpose of an agricultural extension service is to bring information about production techniques and inputs and about markets to farmers. But services can supply material factors as well: fertilizer, plows, oxen trained to pull implements, selected seed, fungicides, credit, among other things. Often, the service also aims to gain some leverage over production techniques, usually through credit. It will rule, for example, that to qualify for inputs on credit the farmer must agree to follow certain practices.

Agricultural services can give government a positive function in the lives of farmers. Services are no stronger than the organizations that deliver them. Rural services suffer with other parts of government when civil servants cannot be adequately paid and equipped. They also can be diverted into patronage relationships in which recipients of services must in return give loyalty or material goods to the officials who provide the service. For those not favoured, the service becomes a mark of the injustice of government.

The success of agricultural services depends not only on the quality of the relationship between civil servants and farmers; it depends also on the quality of the information and inputs that the service provides. In Africa, overall, agricultural services have a record of biasing assistance to the larger and richer farmers, sometimes to new entrepreneurial farmers drawn from the administrative and military elites. They also have frequently suffered from technical lapses, including largely ignoring food crops.

Services not directed to agricultural production are of great importance to the food security of rural people. Hunger weakens health and poor health weakens productivity. Poor or absent

health services amplify the ill effects of hunger. Education provides an avenue to off-farm jobs for young people in farming communities. When education is cut back, it diminishes the opportunity for migration to jobs in urban centres. It also weakens the opportunity for girls to gain more autonomy and power as female members of domestic units and villages. Education is a major force in equalizing gender relations; when education suffers so does the position of women suffer, including the strength of women as producers.

Donors that have invested in rural development services have sometimes tried to insulate the administration of the services they support from weaknesses and patronage in government services. They have sought guarantees of strong support from the strongest ministries and administrative units. Sometimes they have chosen to set up their own quasigovernmental administrative systems complete with housing, financial services, machinery repair, service units, vehicles, and field offices. Top administrative posts can be kept in the hands of expatriates who are presumed to be out of reach of patronage pressures.

Although the middle ranks of such NGO-led service organizations may be more able to perform their tasks than are government service organizations, at the top, the pressures to please the right factions in high government offices is considerable. At the level of interaction with local people, the agents of the organization still have to contend with the local power structure and usually have to take sides with the locally powerful people. Thus, those in opposition, often disproportionately the less prosperous and less effective people, find themselves still disadvantaged. They may simply refuse to cooperate with the outwardly politically neutral development organization. Under some conditions, insulating a development agency from the pressures that operate on ordinary government administrations may improve functioning, but it can hardly become a broadly applied tool for effective development work. Except in special cases, government has to do the work of government.

Dialogue Between Administrators and People

The tool that may be able to strengthen the capacity of government, improve the technical quality of development information, and increase the capacity of local people to increase economic efficiency and enlarge local food security is dialogue between administrators and people. The utility of the tool has to be stated in conditional terms because the outcome is problematic at best. Dialogue does little in itself, but it has the potential to strengthen and make practical the other tools of change: opening to market forces, introducing technology, supplying services, and commanding certain actions. It also encourages people to believe that they can indeed take local action to improve production and availability of food.

Administrators or NGO personnel who come from outside the local community and who have a national or regional perspective bring special capacities to the discussion. They are in a position to know something about how the locality in question compares with other localities and regions with respect to resources, services, and living conditions. They should know whether the locality is part of a larger area that is poorly serviced by roads or health facilities or market facilities. They can inform the people in the area about where the locality stands in national plans to augment or to cut services.

At the same time, only people in the locality know the local implications of augmenting or cutting services. They have the knowledge relevant to questions of where to build roads and to locate offices. They have ideas about the detailed content of the services in question. The case for real dialogue, a dialogue that influences the content of government action and popular action is very persuasive. A condition for real dialogue is a degree of trust and a sense of mutual responsibility. Dialogue itself may help to generate the trust and responsibility that are needed. A context of public dialogue between government or NGO workers and local people will not eliminate the competition for resources and entitlements, nor will it reverse the dominance of self-regarding motives, but it may bring competition and taking-care-of-oneself into contact with the existence of shared or complementary needs and the possibility of mutual gains.

Beyond Dialogue to Research

The self-knowledge of people in the local community is very great, but it has two important limitations. One is its often anecdotal and approximate character, whereas policymakers and administrators rely on systematic and definite information. Another limitation is very likely to be present. Local people do not usually easily reveal the degree of inequality and conflict within the locality, yet differences among households and individuals in the locality will play a crucial part in determining the human impact of food stress and the success of efforts to combat it.

For both these reasons, the dialogue within the community needs to be deepened. The methods of participatory research can be of immense help in the task. By bringing together the whole group of a locality's leaders and members as experts on the locality and by using mapping and graphing techniques, the self-knowledge of the locality can be cross-checked and systematized. It may also be possible to make explicit the different production and consumption opportunities available to people of different categories. The categories will be articulated by the local experts themselves, so they are most likely to reflect the local reality. Households headed by women, members of a marginal ethnic group, households whose adult workers have been struck by health problems, households without cattle — whatever differences make a difference in the locality in question will be picked out if participatory research is properly employed.

The research can also go beyond investigation of static differences to gaining information about the way the forces that contribute to change in food stress interact over time. How problems of land, markets, and health interact to deepen food stress. Or the way in which new farming techniques, better organization of labour, and cooperation to build a new well fit together to improve food production and food entitlements. There are often distinct phases or thresholds in the degree of food stress. Research can establish how many people and what categories of people have reached that phase. Knowledge of these dynamic interactions and stages is crucial for selecting and targeting remedial action.

In principle, people from the locality and administrator–experts from outside each have something vital to contribute to a productive dialogue. No one knows better what producers can do, what constraints and possibilities they face, than the producers themselves. They are in a position to know the problems that technologies will face in practice. They can foresee the reactions to commands and to market forces. What is more important, they can work through

some of the problems in local social relations that change in the mix and efficiency of local production is likely to bring. Outsiders, for their part, have knowledge of techniques and inputs as yet poorly known locally. They also know about current and impending government programs, the likely evolution of external markets, and the comparative experience of other similar localities. It seems that with a minimum of good will, all participants stand to gain from making a dialogue work.

Changing Political Space

Why then does the relations between government officials or NGO workers and local people appear to be so problematic? I think the reasons for difficulty become clearer if we recognize that we are talking about political change. New forms of dialogue between people and government constitute a political change that impinges on the local configuration of power; therefore, there are real dangers for powerful groups in reforming communication between people and government. Where politics has been structured overwhelmingly via patron–client relations and class power, the resistance to creating a new form of dialogue will be potent. The most favourable circumstance is a mutual reinforcement between people and officials in which popular participation enforces honest and straightforward action by administrators and participation by officials encourages equal participation by people who are usually at a disadvantage in the face of strong and privileged local people. Four elements in the political equation are likely to pose particular difficulty:

- Shifts in the power relations between administrators and people,
- Shifts in the power relations between stronger and weaker local people (including between men and women),
- Change in the language of politics and power, and
- Interference with the private benefits certain people are gaining from the current configuration of power.

To think about the way the pattern of politics relates to the problems of creating a new dialogue on improving food entitlements it helps to consider the process involved in holding a successful participatory research meeting. Key points include the following:

- Choosing who may come to the meetings where the new dialogue takes place.
- Controlling who can speak at the meeting.
- Regulating what topics can be raised in the dialogue.
- Directing the power of decision in the dialogue.

The meeting is an opening state in establishing a new capacity for internal dialogue and external political action in the locality. It is important, therefore, to lay it down from the out-set that all persons who may have knowledge or involvement relating in any way to food stress have a right to attend and to speak. That means everyone, without exception, because everyone eats. Already the meeting will be different from the usual meetings, and it will face the power of custom and the tyranny of local common sense and public values. For example, the following may pertain: the few women who come sit together far from the centre of discussion and do not speak, people of the minority ethnic group are not informed of the meeting, and the topic of land distribution is somehow never mentioned, although unequal access to land is a social fact.

One of the jobs of the facilitator of participatory research is to notice the subtle and not-so-subtle controls over who speaks, what is said, and how decisions are reached, to move from noticing to shaping the meeting to allow the kind of discussion that can make progress on issues of food security. Fortunately, in Africa almost everyone believes that all people have a right to social and ecological conditions that allow them to work to achieve food security. That belief gives a strong moral basis for arranging the discussion so that the relevant people can discuss the relevant issues. It is a grounding for reconstructing a degree of trust and responsibility even where the ethic of survival has taken hold. Nonetheless, for several reasons, restructuring political space can arouse powerful political reactions and anxieties:

- Administrators and other experts are reluctant to submit their expertise to the test of popular knowledge. Their position and income is legitimized by their expertise; therefore, to question their expertise endangers the legitimacy of their privilege. Hence a tendency to hide behind vague claims that cannot be queried or tested in the way that the new dialogue must be able to do.

- Powerful local people are unwilling to put up for discussion the basis of their power in, for example, land distribution. Why bring it up if there is any danger that the discussion will take the direction of questioning the distribution of basic resources like land?

- The language of politics almost always favours the position and the issues that legitimize the power of the powerful. To open and alter the language of politics is to open power relations for possible alteration in a way that the powerful are unlikely to approve.

- Changes in all existing structures of power are made more difficult because under conditions of stress officials and community leaders are almost invariably benefiting in personal and private ways from the public positions they hold. The risk of change directly impinges on the entitlements they have acquired, often at some effort and cost.

The tools of change relevant to attacking the problems of food systems under stress almost certainly will disrupt the established patterns of politics within a locality and between that locality and the government. Participatory research, by revealing obstacles and conflicts, promises to help

to overcome them. Participants and facilitators are able to gauge the depth of public cynicism and to identify places where mutual gains are possible.

Even discussing shared problems begins to build a sense of common endeavour. Conflict and obstacles will still be painfully present, but a renewed political space may make it possible to select the policy tools that are socially and politically feasible as well as materially effective in combating food stress.

Research into Agricultural Production and Management in Africa: Conceptual and Methodological Challenges

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Abstract *The objective of this paper is to identify challenges to research, most particularly to define silences within that research and ways of searching for meaning within them. In the second part of the paper, I examine elements of gender and class differentiated analysis of struggles over land and agricultural knowledge from the perspective of a feminist political economy of the environment and in relation to questions of agricultural production and environmental sustainability. Methodological implications of this approach are identified in the third section of the paper.*

Context

There was a famine and the husband went to stay in his hut (thingira) and was eating his goats. He told his wife that they were no longer together: "You will eat your property and I mine." The man would slaughter a goat and hang it in his hut. The woman thought she and the children would die and so she went to a swampy region and found nduma cia mwanake (arrowroots of young men) which she uprooted.

She carried this with some firewood and went home. She cooked and ate one without giving any to the children. In the morning she found that she was quite fine and therefore that the arrowroots were not poisonous. She called her children and gave each of them an arrowroot. After they had eaten, nothing had happened to them. She was quite happy as she had found something to eat during that time. So every morning she went to uproot those arrowroots.

The husband was surprised and so one day he called her and asked her why she and the children were not growing thin whereas even those who were eating meat were growing thin. The woman told him that she collected arrowroots from the forest and ate them and that was why they were not getting hungry.

The man asked her to go and get them so that he could also eat. She went and brought them to him. The man peeled them and ate. He even told her that the meat that was in his hut was to be cooked by her and that they were to start living together in the same house. Every morning the woman went to uproot the arrowroots and she could even leave her husband cooking them while she did something else. The famine finished and they joined again.

When the land was cultivated those arrowroots were uprooted by the woman from where they had grown naturally and she planted them in areas where there was water. She planted a lot.

Wanjiru

What soup will you serve us up in next?

Fatou Sow

Two quotations provide an entry point for a discussion of conceptual and methodological challenges to research into food systems under stress, specifically, in conceptualizing the relationships among agricultural production, poverty and the environment. The first, a story recounted by an elderly Kikuyu peasant farmer as she drew with her stick on the hardened brown-red earthen floor of her home, directs attention to the deeply political nature of the relationship between people and their environment.

With lighthearted amusement, she spoke in the company of her husband, the first wife, and a friend, in an interview in 1984[1] whose objective was the collection of gender and 'class' specific oral agricultural history. She left no doubt that she was aware of the contested terrain to which her story alluded. The second quotation identifies the force behind the methodological questions raised. Spoken by Fatou Sow, a professor at Cheikh Anta Diop University, Dakar, at the first meeting of WEDNET,[2] in May 1988, an IDRC initiative whose aim was to make visible the relationship between gender and resource management, the question reveals both the sense of frustration with theoretical inadequacy in that field of scholarship, and, more generally, the sense of powerlessness as a researcher in the South in defining the problem and its resolution, in having little control over the production of that knowledge.

From this starting point, of the political embeddedness of research into agricultural production, the objective of this paper is to identify challenges to research, most particularly to define silences within that research and ways of searching for meaning within them. In the second part of the paper, I examine elements of gender and class differentiated analysis of struggles over land and agricultural knowledge from the perspective of a feminist political economy of the environment and in relation to questions of agricultural production and environmental sustainability. Methodological implications of this approach are identified in the third section of the paper.

Concepts

A feminist political economy of the environment distinguishes itself from "women and environments analysis" (Dankelman and Davidson 1987; Kettel 1990; Sontheimer 1991)[3] primarily through locating gender, rather than women, centrally in analysis of the relationship between economy and environment. A principal concern is to differentiate *among* women in terms of class, age, and marital status, as well as between women and men, in contradistinction to accepting

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[1]Interviews were conducted with members of 35 households in an area of smallholdings, Murang'a district, Central Province, Kenya, in the context of doctoral research.

[2]WEDNET (Women, Environment and Development Network) was formed at a meeting of African and Canadian researchers in May 1988 at York University.

[3]It should be noted that the volume edited by Sontheimer (1991) includes Agarwal's paper (1988), which takes a broad political economy approach in the analysis of the fuel crisis in rural South Asia and Moser's et al. (1991) research in Latin America. Neither of these chapters falls readily under the "women and environments" rubric.

"women" as a sufficient analytical construct. As Leach (1991, p. 22) points out, although gender differentiation does not capture the entirety of "difference" in relationships between people and their environments, as a critical source of difference in farming systems in sub-Saharan Africa, it provides a way into a historically grounded analysis of issues of agricultural production and environmental sustainability (including local knowledge systems and environmental action). This captures the iterative nature of the relationship between what goes on at the local level (whether the "black box" of the household (Watts 1989) or of the community) and the large-scale process at the national and international level.

In part, this approach draws on work by Redclift (1984, 1987), Blaikie (1989), and MacNeill et al. (1989), which views the environment as socially constructed and locale-specific environmental change as a "social process, inextricably linked with the expansion and contraction of the world economic system" (Redclift 1987, p. 3). Succinctly, as Redclift explains, the poor "impose excessive strains on the carrying capacity of the natural environment because of the structural demands imposed on them" (Redclift 1984, p. 130). Whether through long-term debt or the need to meet immediate cash needs, exacerbated inter alia by deteriorating terms of trade for agricultural commodities and rising interest rates, farmers, and particularly the poorest, are pushed to intensify land use or extend production onto more fragile land.

As internationalization of the environment proceeds, Redclift (1987, p. 51) argues, so is the contradiction between the economy and the environment deepened. In global terms, the "central contradiction of advanced capitalism" in terms of relations between the North and the South, concerns not only the exploitation of labour "but through this, exploitation of the environment in ways that are unsustainable in the long term" (Redclift 1987, p. 51).

Redclift (1987, p. 65) briefly recognizes the link between the loss of local environmental control and gender-differentiated access to and control over resources, yet fails to connect this observation to his overall analysis. Where such differential access to and control of the means and resources of production results in "a double subsidy" as Stamp (1986) argues, to capital as women labour without a wage, or without an adequate wage, and to husbands, who appropriate the proceeds of their labour, and where women have prime responsibility for agricultural production, at the centre of the contradiction lies the exploitation of female labour. The "simple reproduction squeeze," which Bernstein (1979, p. 427) theorizes, whereby land and labour are exhausted as production is commoditized, is felt most severely by poor women farmers. With prime responsibility for food and frequently export crop production in sub-Saharan Africa (Staudt 1987; Gladwin and McMillan 1989), and for household reproduction, yet without commensurate security of access to and control of land or labour (Muntemba 1981; Staudt 1987; Stamp 1990; Mackenzie 1993), the "squeeze" results in maximizing short term economic gain at the expense of longer term sustainable land management. What Blaikie (1989, p. 22) calls the 'option value' of soil conservation activities declines under these conditions, with the most serious results on holdings of the poorest.

Sustainability in agricultural production and management, then, is integrally related to security in rights to land, to labour and to its product, as these vary with increasing polarization in rural societies (e.g., Mbilinyi 1988 for Tanzania; Bienefeld 1989) and as the environment is internationalized. Negotiation and struggle over these rights, as Berry's (n.d., 1984, 1989) work indicates, have been part and parcel of the commercialization and growth of African agriculture

since the first years of colonialism. Property rights, for example, were "politicized rather than privatized" over much of Africa "and strategies of accumulation were directed toward building power over resource rather than increasing productivity" (Berry 1984, p. 92). For this reason, despite state legislation effecting land tenure reform and the institutionalization of individual freehold tenure in parts of Africa, "customary law,"[4] dependent on the maintenance of rights in people rather than things as Chanock (1985) explains, and subject to continuous negotiation and reconstruction by individuals differentiated by gender and class (Mackenzie 1990), becomes one of the political instruments through which complex interlocking and multiple rights to land are negotiated.

Berry (1989, p. 49) emphasizes that, under stress, as in the current economic crisis, people diversify their economic activities in ways that have an impact on the environment. People engage in activities with shorter gestation periods and there is a reluctance to invest in long-term projects. This argument is extended by Leach's (1991) observations with respect to gender differences in land and tree management in eastern Sierra Leone. In conceptual terms, what this means is that the "dialectic between social and environmental change" (Blaikie 1989, p. 232) is of a deeply political nature. As Mearns (1991) proposes, it is a nonlinear, plural, and multidimensional problem.[5]

One example, drawn from a densely populated, coffee-producing area of Kenya, may illustrate some dimensions of the argument.[6] In Murang'a District, Central Province, as elsewhere in Kenya (Stamp 1975–1976; Davidson 1987), women now produce food crops, for subsistence and for the market and export crops, here tea and coffee. Their responsibility for export crop production is related to high rates of male outmigration, reaching over 70% of adult men in some locations. But commensurate remuneration for this shift in labour has not followed. Marketing and the initial processing of coffee is organized through 16 local coffee societies of the Murang'a District Farmers' Cooperative Union (MDFCU). Payment, which has a history of being erratic, is made to shareholders, predominantly male land owners. Of two coffee societies for which data were collected in 1984, in one, Irati, 17% of the membership was female, in the second, Njora, 10%. Women farmers expressed bitterness over the unreliability of remuneration from their husbands for their labour on this crop.

Two implications for the argument pursued in this paper emerge from this situation. First, a substantial number of women respond by withdrawing their labour during the peak coffee-

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[4]"Customary" law, following this conceptualization, is not static, ahistorical, or autonomous, the product of a "self-contained particularity" (Fitzpatrick 1988, p. 1). Nor is it purely an imperial construct, fixed or frozen through the colonial project as Snyder (1981) implies. Rather, following the conceptualization of Parker (1972), Glazier (1985), and Moore (1988), "customary" law refers to a continually contested legal domain.

[5]Mearns (1991, p. 29), following Miller (1985), suggests that the problem is a "wicked" one, representative of open systems that are "complex, ill-defined and difficult to bound, and information about them is commonly incomplete and ambiguous." He does not include gender in his analysis.

[6]The data were collected as part of research for a doctoral dissertation (Mackenzie 1987). The data included here are published in Mackenzie (1986).

picking season from their own *shambas (i.e., farms)*, selling their labour individually or as groups locally to other smallholders or travelling by truck daily to the nearby coffee estates in Kandara and Makuyu Divisions of Murang'a or to nearby Kiambu District.[7] In each case, women have direct access to daily wages. The decline of quality in coffee production in the district in the early 1980s, a consequence of women's action, was subsequently attributed by the MDFCU to unreliable societies in areas of high male outmigration, Thanga-ini and Irati, had, respectively, 79.2 and 55.4% of the total accounts held jointly.[8]

Second, with land scarcity, caused by growing polarization in the size distribution of smallholdings, an increased population, and a reduced land base for food crop production as male owners turn over more land to coffee production, it is likely that women will increasingly intensify production of those crops over which they do exercise control (i.e., food crops), with a view to meeting immediate needs of household reproduction, at the expense of long-term sustainability of the resource base. In the struggle to make ends meet — necessitating among poorer households[9] the sale of labour for a wage or involvement in petty trading — it is increasingly unlikely that there will be time or labour sufficient to undertake labour-intensive activities such as mulching or green manuring or the construction of *miconjo* (piles of leaves and other vegetable matter laid perpendicular to the slope such that soil erosion is prevented) necessary to sustain the resource base. For a more complete discussion of this argument, see Mackenzie (1993).

To extend this argument, it is necessary to acknowledge, as Kettel (1990, p. 5) does, that this action, or inaction, on the part of women "frequently violate[s] their own knowledge and concern for the well-being of their neighbourhoods." Such use, or misuse, of the environment, Watts (1989, p. 15) explains is "a function of the intersection of resource managers with extrahousehold, non-local circuits of accumulation and surplus extraction" as illustrated in the foregoing example. But in the process of such articulation, it is likely that there will be further loss of the ecological specificity (Richards 1983, p. 56) of local knowledge, whose consequences must be measured in terms of loss of biodiversity, in terms of questions of power/knowledge locally, and in terms of wider scales of social interaction.

Local knowledge or "indigenous knowledge" does not mean here "ethnographic artifact" or "unconscious ecological wisdom" to borrow two of Rocheleau's (1991, p. 157) phrases, but, as she proposes following Thrupp (1989), to the legitimization of local "knowledges"[10] through a

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[7]Evidence for the withdrawal of women's labour from elsewhere in Africa comes, inter alia, from Jones (1986) and Carney (1988).

[8]The equivalent figure for Njora was 17.1%.

[9]Murang's District *Development Plan 1988–1993* (Kenya, Murang'a District 1989) identifies 35% of the population in the high potential areas of Kandara, Kigumo, Kiharu, and Kangema Divisions as being below the poverty line. In Makengu Division, the equivalent figure is 65%.

[10]The notion of "knowledges" comes from Michel Foucault's (1980, pp. 83–84) theorization of the relationship between power and knowledge. He argues that "knowledges," defined as unscientific or low-ranking, have been buried by "functionalist and systematising theory" and are frequently defined as illegitimate.

redefinition of environmental discourse. In Foucault's (1980, p. 81–82) terminology, such knowledge has been "subjugated" through the operation of "functionalist and systematising theory" and excluded on the grounds of being deficient cognitively or in terms of "scientificity." Both devolve, to follow Mudimbe (1988) in *The Invention of Africa,* from the subjugation in general of African "knowledges" through the pervasiveness of a Western epistemology.

The task of uncovering silenced "knowledges" involves engagement with the theoretical and methodological assumptions of epistemological ethnocentrism, as Mudimbe (1988, p. 71) argues. In that environmental/agricultural knowledge is gendered (for example, Carney 1988; Shiva 1988; Carney and Watts 1990; Stamp 1990; Leach 1991; Rocheleau 1991), the task also concerns uncovering androcentric assumptions in scholarship. In conceptual terms, this means that the research problem is defined not in terms of cataloguing women's knowledge about agriculture or the environment, but of recognizing that such knowledge is constantly recreated and renegotiated within the context of political rights and responsibilities — within the household, the community, the nation and internationally. As Rocheleau's (1991) stories from Machakos District, Kenya, illustrate in the context of the drought of 1984, survival was dependent not only on botanical and agricultural knowledge, but on how women, individually or in groups, mobilized political skills to access resources, in private plots, or public lands — from men.

Method

With this as a premise, what are the implications for research? In answer, what follows is intended to be provocative rather than definitive. First, and most fundamentally, thinking must be focused around the question: in whose interest is this particular research? As there has been a tendency in research to look at interrelationships among food production, poverty, and environmental production to marginalize local issues, a strong case may be made for directing research toward this level. By this I am not implying that this level may be isolated. Frequently, given the multidimensional nature of the problem, research needs to proceed iteratively to connect what goes on within the household and community with what goes on at the national and international levels — to connect the micro- and macropolitical economies. Questions of food security at the local level are deeply embedded in political issues — access to and control of resources and, in turn, environmental change — at all levels.

If the research is to serve the needs of the people most immediately implicated, the research hinges on their collaboration in defining the problem and their priorities in its resolution. Further, if local expertise is not to be separated from the political environment in which it exists — and become bits and pieces of decontextualized knowledge, "ethnographic artifacts" in Rocheleau's (1991, p. 157) language — local people must be actors in its definition. From this point, the grounds for a reshaping of the discourse, through the liberation and valuing of previously subjugated "knowledges," may emerge.

In this context, it is necessary to recognize diversity within rural populations. Research into food security needs to take account of the fact that differences of gender, level of wealth, or basis of livelihood mean that women and men, differentiated by wealth and livelihood responsibilities, will have different "knowledges" on which to draw. As Stamp (1990, p. 124–129) and Rocheleau

(1991, p. 157) point out so clearly, the task of unearthing local "knowledges" is a double one, involving creating a discourse reflecting African rather than Western "knowledges" but also challenging what Stamp refers to as the "gender blindness" of such knowledge.

Thus, for example, if one is concerned in a research effort to trace the relationships between economic policy (e.g., agricultural measures carried out under structural adjustment programs) and the environment with the objective of understanding their implications for food security, it is necessary to ask questions that recognize the gender specificity of such knowledge and experience and the gender specificity of responses to increasing economic pressures. The line of questioning might proceed as follows, recognizing that gender relations, rather than women (as in "women and environments" discussions) inform political economy analysis. In understanding food security issues as they relate to agricultural production and management, to what extent have external debt and policies adopted to service or meet repayment schedules exacerbated stress on the resource base, reducing what MacNeill et al. (1989, p. 27) call "basic natural capital?"

Many Structural Adjustment Programmes (SAPs) focus on the promotion of commodities such as cocoa, coffee, or tea, but when international prices fluctuate wildly, or when there is a consistent decline in the relative terms of trade in such commodities, how do farmers in the South respond? Are the environmental costs of global gross national product (GNP) transferred through such trading practices to the South, as MacNeill et al. argue? If so, through what processes does this occur? When food subsidies are removed, is the effect on farmers uniform? Who benefits? Are large- and small-scale farmers, women and men, affected in the same way? To what extent does this process translate into a reduction of exploitation of the resource base, the soil? Or does a skewing of resources to rehabilitate the export sector render marginal any change in food crop price?

If it is accepted, at a general level, that there is a differential impact of SAPs on women vis-à-vis men (Cornia et al. 1987; for Ghana, Ghana 1987; Tanzania, Tibaijuka 1988; Commonwealth Expert Group 1989; Zambia, Evans 1989; Nigeria, Onimode 1989; Wagao 1990; Elabor-Idemudia 1991; Meena 1991; Zaire, Schoepf and Engundu 1991), how do women farmers, caught in the trap of inequitable property regimes and modes of remuneration and under conditions of significant budgetary autonomy (e.g., Moore 1986; Staudt 1987), respond? Do they opt to maximize short-term agricultural production at the expense of long-term sustainable land management? To what extent do they violate their own knowledge base in so doing, as Kettel (1990, p. 5) suggests? Or, to what extent do they draw in their historical knowledge of ecology and politics to recreate what Rocheleau (1991, p. 161) refers to as "the requisite science of survival?"

The boundaries of such knowledge, as she points out, are neither static nor independent. Rather, the "[content] and distribution of gendered knowledge influences and is influenced by the gender division of rights and responsibilities in national, regional and local contexts." (Rocheleau (1991, p. 161). In her experience in Machakos District, Kenya, poor women survived through a "careful interweaving of social and ecological knowledge to survive in the cross-currents of erratic environmental conditions with uncertain terms of resource use, access, and control" (Rocheleau 1991, p. 162). The latter had to be constantly renegotiated with individual men and the collectivity.

Before proceeding, a caveat is in order. To privilege gender as I have done in the foregoing is not to deny either the significance of "community" or the collectivity in understanding questions related to food security, or to argue that gender is of greater analytical significance than level of wealth or class. Notwithstanding the fractures or tensions within rural communities (see Barber 1992; Taylor and Mackenzie 1992), there are times when the objectives of different interest groups are served most expediently through collective initiative (e.g., Dei 1992).

At other times, as Thomas (1988, p. 22) has argued with respect to the politics of Harambee in Kenya, "strong communal identities" frequently coexist with "nascent class awareness." Adhesion to a community solidarity may also coexist with a contradictory gender awareness (Stamp 1986; Mackenzie 1990). The result is the complex interplay of individual and collectively perceived rights and responsibilities that, at times, are realized through collective action and, at other times, are not. In essence, with reference to agricultural production and management, under stress, what it means to be a farmer is constantly renegotiated in the context of individual and collective — gendered and class - interests. At times these interests are shared, at times complementary, and at times conflicting, as Leach (1991, p. 19) demonstrates in the case of resource management in eastern Sierra Leone.

The foregoing analysis demands of research that attention be paid to the processes implicated in resource management as only through processual analysis, which proceeds iteratively to connect the relations between micro- and macropolitical economies can the fundamental questions regarding the links between food production, poverty, and environmental degradation be understood. To capture the changing nature and complexity of such relationships, research must often be grounded in detailed case studies that recognize differences in rights and responsibilities among rural peoples. Questions of agricultural production and management need to be investigated within the broader social and political context at the local level, and then explored with reference to the wider or macropolitical economy. As Leach and Mearns (1991, p. 52) point out, from a basis of multiple case studies, "strong causal propositions" may emerge to challenge previously held explanations.

Such research, by definition interdisciplinary, will need to employ a range of complementary research methods. Qualitative research methods will, in most situations, form the core of such research, with the use of quantitative analysis to complement the findings. For such research, success may depend on the effective collaboration of local people. In essence, if the research is to serve their (different) interests, the "normal," i.e., hierarchical relationship between researcher and researched, will need to be replaced to allow, in Rocheleau's (1991, p. 158) words, for "a more active exchange at the interface of knowledge systems."

Although ethnographic research may comprise a core for some studies, and Pottier (1991) would argue that the in-depth nature of such research may not be compromised by short cuts, a growing literature on participatory research suggests that for many purposes, participatory rural appraisal (PRA) methods allow for flexibility in time and the opportunity to understand *processes* of change (for example, Chambers et al. 1989; Cernea 1990; Chambers 1991; Moser and Sollis 1991). Collaboration between IDRC and the Dene Cultural Institute, adopting a "participatory action" and "community-based" approach, indicates ways in which research into local knowledge may be reoriented in ways congruent with local agendas (Johnson 1992).

A new literature on PRA informed by gender-awareness suggests that understanding complex gender relations similarly does not always necessitate extended field research (McCracken 1990; Leach 1991; Rocheleau 1991). It also suggests that action research, whereby there is in effect a meaningful partnership between "researched" and "researcher," is vital for a successful outcome of the research process and if "intellectual colonialism" (Leach and Mearns 1991, p. 52) is to be avoided (more generally, see Reinharz 1992).

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